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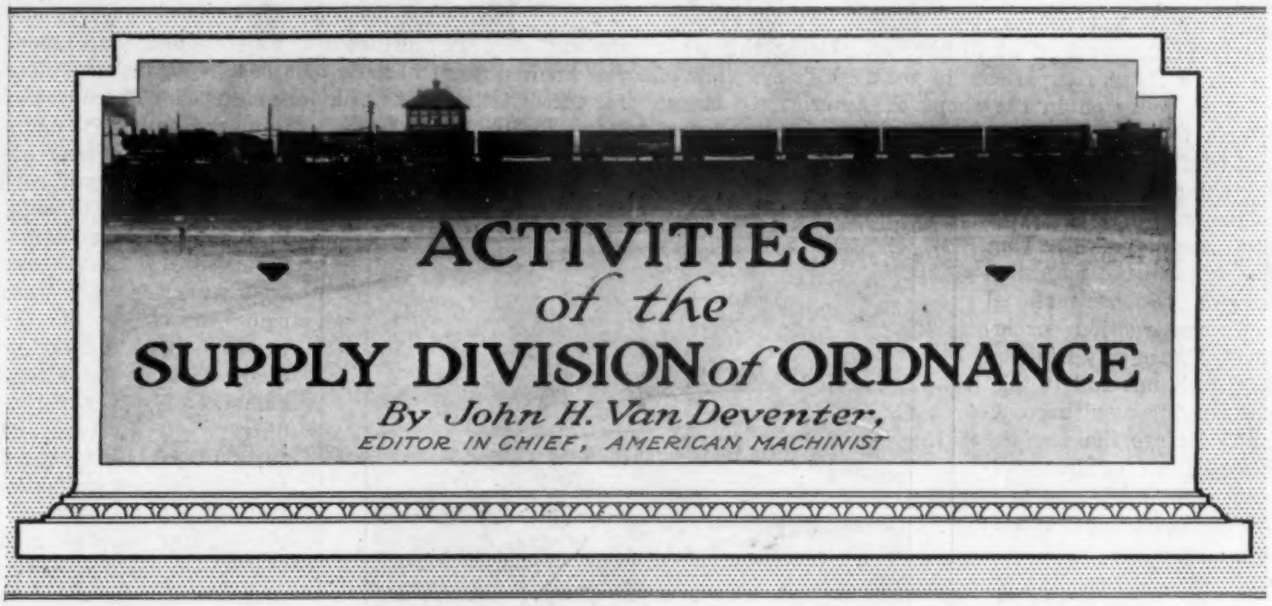


ACTIVITIES of the SUPPLY DIVISION of ORDNANCE

By John H. Van Deventer,
EDITOR IN CHIEF, AMERICAN MACHINIST

WE HAVE seen in a previous article how Ordnance activities are set in motion by the Estimates and Requirements Division, which establishes the Ordnance purchasing program. The Supply Division, in contrast to this, completes the cycle of Ordnance activities by putting the completed article at the disposal of our troops. These two divisions may be said to represent the alpha and omega of Ordnance. The modern manufacturing plant, extending over a number of acres and embracing a number of departments, each of which are contributory to the final assembling room, finds that the storage and transportation of parts between its departments are problems of serious moment. If these problems are incorrectly determined there will be congestion of work in one department and lack of work in another, resulting in a material decrease in the efficiency of the plant. But if the problems are correctly estimated we find a smooth-running organization where, without apparent effort, component parts flow into and out of stores and come together as if by magic in the final assembling room.

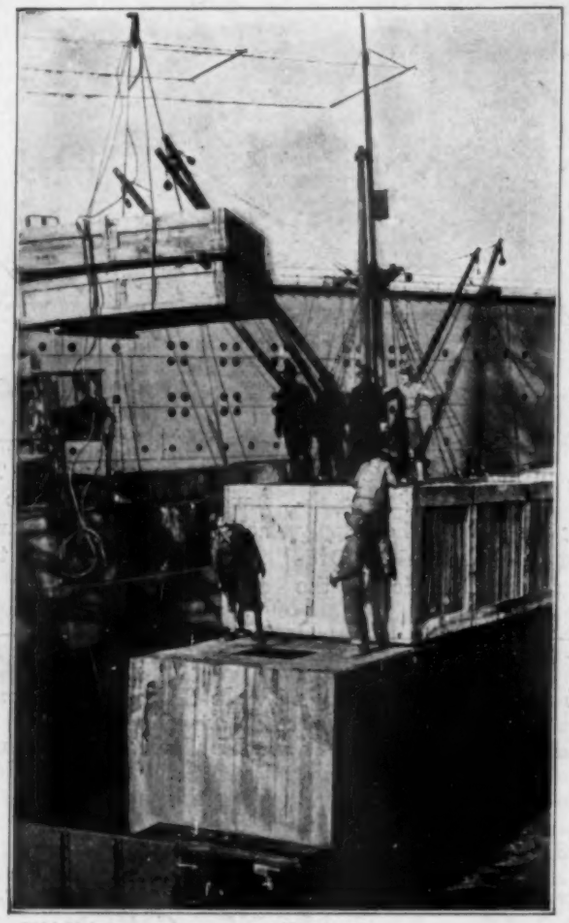
The Supply Division is Uncle Sam's traffic manager, shipping clerk and warehouse man for ordnance matériel. It is this division that takes the product of the manufacturer and places it in the hands of our troops. Considering the fact that more than nine billion dollars has been spent for ordnance work since we entered the war, and that the greater part of the matériel provided is for shipment abroad, the task of the Supply Division of Ordnance, headed by Col. J. C. Heckman, is a gigantic one. This article tells something about it.

The United States today, especially that part of it east of the Mississippi River, is one great departmentalized manufacturing plant, the principal product of which is ordnance matériel. Five thousand shops and factories distributed over the length and breadth of the country make up the departments of this wonderful organization and combination of industries.

Surprisingly few of these scattered plants are self-sufficient or, in other words, start and finish complete ordnance mechanism. The quantities involved in ordnance contracts are too great to allow of this, and the solution is for each plant to specialize on the part that it can handle best, and then pass the product along to a succeeding plant which receives it as raw material. A graphical representation of this appears on page 1110; and shows a typically complex chain of factories dealing with a typical contract for such a common article as the 75-mm. shrapnel, of which millions are being made. The same problems of transportation and storage that face the single departmentalized plant just mentioned face the United States Ordnance organization in its widely scattered industrial plants—the same problems, but of much greater difficulty of solution, not only because the distances are hundreds of miles instead of hundreds of yards, but because the principal means of transportation are of necessity our already congested railroads. More difficult also because interdepartment storage in this national plant calls for the erection of central warehouses to care for the enormous flow of materials, and to enable this to be adjusted to the capacity of the railroads and to the needs of contractors to which these warehouses are contributory.

So much for the scope of the problem with which the Supply Division has to deal. Now to get a conception of its size. Measuring effort by the only common measure that we have available, it can be said that twenty million dollars' worth of human energy and raw

material is going into ordnance every working day. Before the war the average American manufacturing plant which had 500 workers turned out an average yearly product valued at $1,000,000. Using this as a means of rough comparison, to get a bird's-eye view of what is going on in the shops of America, Ordnance efforts today are equivalent to six thousand manufacturing plants, each employing 500 workers and each one devoting full time to the manufacture of ordnance matériel and construction exclusively. The Supply Division has its hands full to take care of the resulting output. Before the war the distribution of our ordnance matériel was handled through the Ordnance Department arsenals, some of which also acted as manufacturing plants. Within the United States the distributing arsenals were Benecia Arsenal in California, San Antonio Arsenal in Texas, Augusta Arsenal in Georgia, New York Arsenal in New York, Watertown Arsenal in Massachusetts, Watervliet Arsenal in New York, and Rock Island Arsenal in Illinois. Picatinny, Frankford and Springfield were manufacturing plants, which distributed only the stores that they manufactured or that were sent to them for repair. The control of the issue of such stores as were limited in their availability were centered in the four planning divisions of the Ordnance Department in Washington, which at this time consisted of the Equipment, Small Arms, Carriage and Inspection Divisions. No Supply Division existed at this time, this being organized in May, 1917, under the command of the then Col. Charles B. Wheeler, who was later acting Chief of Ordnance. Its functions at that time were to "take charge of all ordnance and ordnance stores procured by purchase or manufactured for issue to the service, to arrange for the shipment of this matérial to designated points, for its storage and custody, for its preservation from deterioration and for its issue to troops." The initial plan of distribution assumed that after a short period production would anticipate demand, and that the problem would become one more largely of storage and distribution than of a follow-up and a controlled issue of stores according to an established priority.

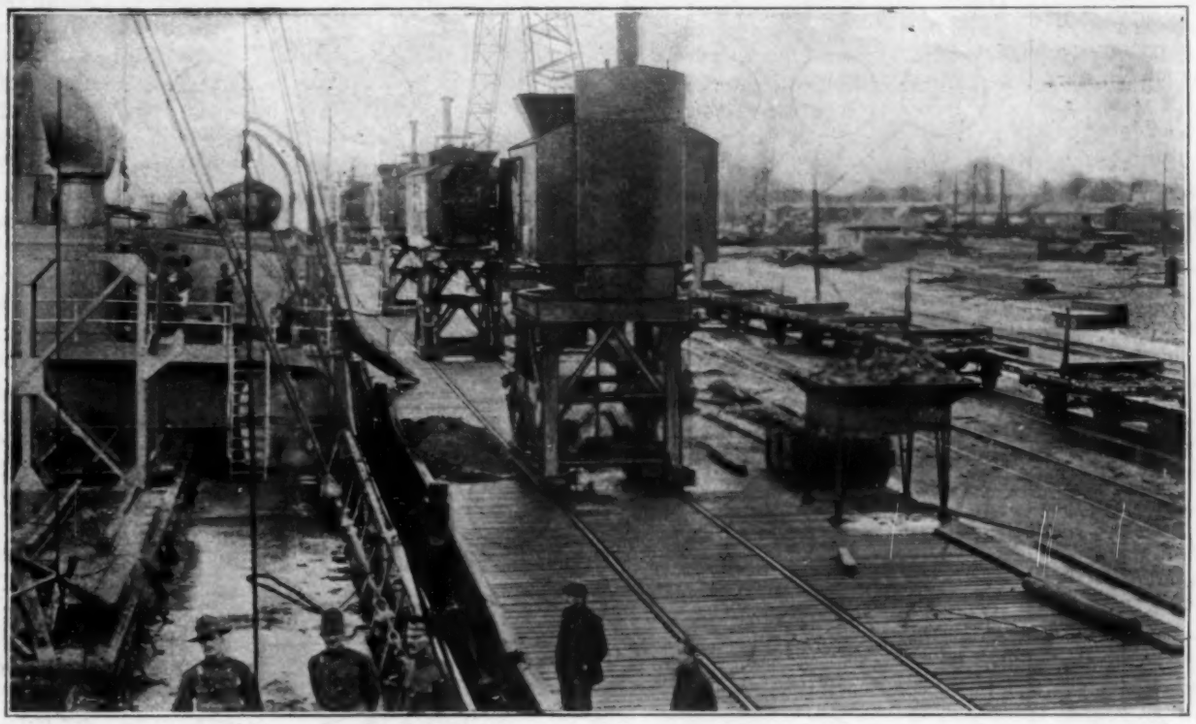


In handling the vast amount of ordnance material for oversea shipment America has learned a valuable lesson in crating machinery to avoid breakage and in reducing to a minimum the cubic feet of cargo space required. This experience will be of untold value after the war by saving not only thousands of dollars in breakage but thousands of dollars' worth of ship space on future machinery and exports.

During the period between our entering the war and the end of 1917 the problem of equipping our troops was made difficult because of a lack of means in France for the distribution of ordnance matériel. There was at that time no plan to equip our troops after they arrived overseas from supplies forwarded in bulk to points of debarkation. On the contrary, our troops at this time were equipped either at the camps in this country or at the ports at which they embarked. Delays in production, car shortage and freight congestion caused many difficult problems and occasioned the rerouteing of supplies in a number of cases. Ordnance depots at embarkation points were developed, the sole function of which was to permit the completion of equipping those troops about to embark. With the completion of the means abroad for receiving, handling and distributing the enormous quantities of ordnance supplies from America there has been a gradual trend toward the completion of the equipment of our troops after they arrive on the other side, the ordnance matériel being shipped abroad more or less independently of the sending of troops, but of course in proportion to it, and distributed from depots in France. In order to permit of this it was necessary to develop and establish in America no less than seven different types of ordnance depots. The conservation of railroad shipping space in this country demands a minimum amount of less-than-carload shipment mileage. On the other hand some manufacturers, especially of small or intricate part or units have difficulty in arranging full-carload shipments. To meet this condition localized assembly depots have been provided, to which manufacturers who produce less-than-carload lots can forward their product so that it may be consolidated with that of others and the long haul may then be made in full carloads.

Primary storehouses are required, to which matériel can be shipped in bulk and there held until required.

These are necessary on account of the impossibility of exactly balancing the varied factors of the enormous ordnance program and of the necessity of keeping matériel away from seaboard until it is required there. Secondary storehouses, or storehouses of distribution, are required, which draw their supplies as needed, and in proportionate amounts, from the primary storehouses, and ship these stores assembled in carload lots to the camp depots or other designated points for the final distribution to the troops. Camp depots were required at the various training camps. Their function is to supply stores as needed, either for equipment or for training, to the men at the camps.



The French port at which American ordnance material is received. Mechanical facilities in the way of cranes, etc., are provided so that tons of munitions from America can be taken directly from the ships that bring them and put on French railway cars. The service of supply in France is an extensive and elaborate organization and built with the intention of equipping troops largely after they arrive on French soil. Previously our soldiers had to be equipped on this side of the water.*

At or near seaboard three different classes of depots were required. One of these classes, as previously described, completed the equipment of troops at the embarkation camps, or those troops about to embark for oversea duty. The second type of storage depot was that required near the shipping ports, to which matériel can be shipped in anticipation of available shipping facilities or for assembling purposes. Here it is available at short notice, by short haul or motor truck, and at the same time does not congest the port itself. Then there is the third type of seaboard storage depot—that at a port from which matériel is shipped when actually en route for overseas. The facilities for storage at or near the immediate piers was soon found to be so limited that it was impracticable to allow individual corps, such as Ordnance, the Signal Corps, the Medical Corps, Quartermaster's Corps, etc., to develop and control individually their own storage facilities.

It was found necessary to unify this control, and in order to prevent congestion on the one hand and, on the other, the holding of empty ship space for one corps when required by another it was decided to place all port storage space under the control of the Chief of the Embarkation Service.

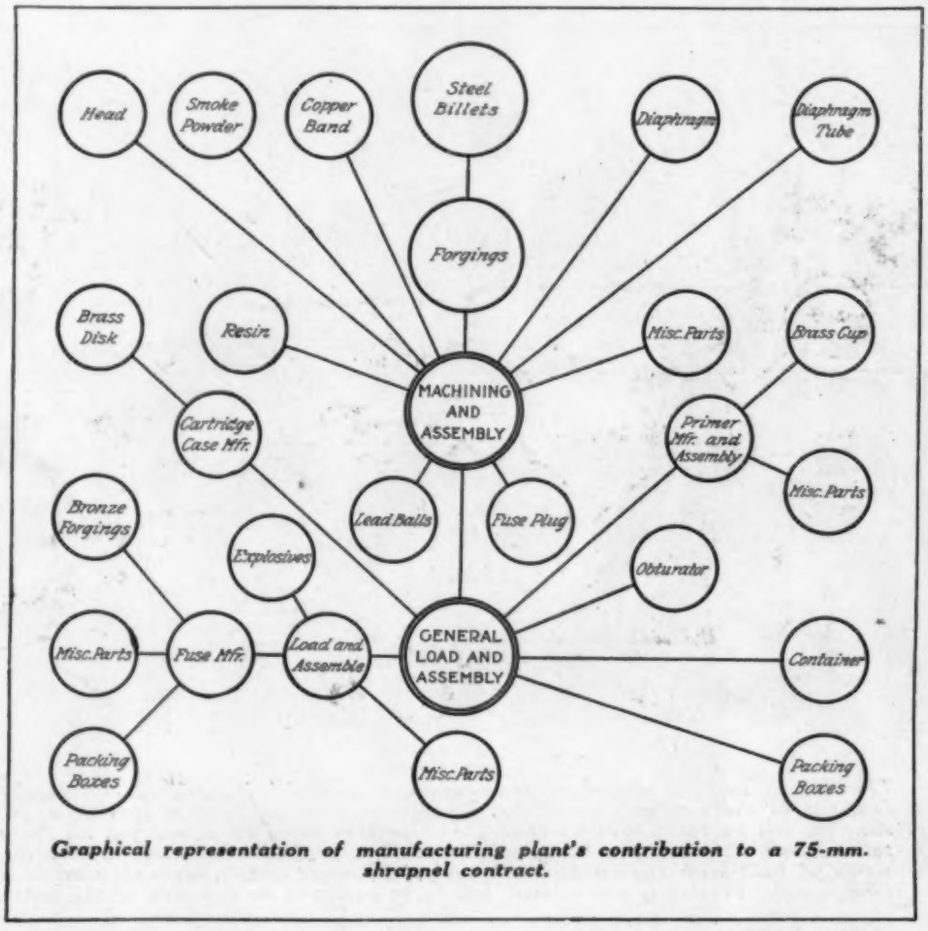
Thirty general supply ordnance depots have been provided during the past year for the purpose of providing the necessary storage space throughout the United States, in keeping with the general system of distribution. A complete operating organization has been developed for each of these depots. The entire operating organization recruited and trained for this work now comprises 132 officers, 1556 enlisted men and 1516 civilians.

During the last fiscal year there has been built under the supervision of the Construction Section of the Supply Division three large ammunition and explosive storage depots and six smaller storage depots at other locations. These depots are used for storage purposes, and shipments are made therefrom of ammunition, explosives and other ordnance matériel for use overseas.

The total storage space which has been made available is as follows:

	Cu.Ft.
Ammunition and explosive storage	19,071,400
General warehouse storage	5,047,910
Vehicle storage	1,562,300
Total storage space completed and available June 30, 1918	25,681,610

There has been spent on these storage depots during the past year approximately $25,000,000. This sum includes, in addition to the cost of the storage buildings, that of the necessary auxiliary utilities of ordnance depots, such as railroads, roadways, docks, dredging, barges, water supply, fire protection, sanitation, electrical generating systems, protective lighting, fire-alarm and telephone system, nonclimbable fences, mechanical equipment for the operation of depots; also barracks and other buildings for the operating personnel. In addition to the work that has been completed there have been authorized additional storage facilities at the three large original depots and new projects at Charleston, S. C., and at a location on the Delaware River near Pedricktown, N. J. The total estimated cost of this additional work is $23,000,000, and when completed will provide the following storage space:



Graphical representation of manufacturing plant's contribution to a 75-mm. shrapnel contract.

	Cu.Ft.
Ammunition and explosive storage	17,140,010
General warehouse storage	7,376,610
Vehicle storage	3,045,000
Total additional storage under construction	27,561,620

The total storage space completed and under way is as follows:

	Cu.Ft.
Ammunition and explosive storage	36,211,410
General warehouse storage	12,424,520
Vehicle storage	4,607,300
Grand total of storage space completed and available and under construction to be completed within year 1918	53,243,230

The shipment and issue of stores are based upon an accurate knowledge of their availability and the anticipation of their completion. Hence, very naturally, it becomes a part of the duty of the Supply Division to keep in close touch with actual and probable deliveries of all of the goods that it handles. Upon the placing of each order by the Procurement Division of Ordnance the Supply Division receives its copy, which shows the place of manufacture, the amount ordered and the anticipated rate of production. It then becomes the duty of officers of the Supply Division charged with the distribution of certain types of stores to inform themselves of the requirements from day to day, and almost from hour to hour, for the particular stores that they handle. Taking into consideration the bulk and nature of these goods, they must be ready at a moment's notice to direct the expeditious filing of unexpected and sudden requirements. Adding to the difficulty of these accomplishments is the fact that less-than-carload shipments must be avoided wherever possible, although many of these stores are manufactured at plants where the assembling into carloads would occasion considerable delay. Again, many items of ordnance matériel are of little value unless accompanied by some essential component frequently manufactured hundreds of miles away. Gun barrels cannot well be fired unless mounted upon carriages, nor can they be used lacking sights; and the loaded shell is of little value without the fuse to detonate it or the propelling charge to send it on its way. Resort to express shipments can be had only where conditions justify it, these being closely scrutinized and controlled to prevent a too common turning to this easy means of relief, with a consequent depreciation of its efficiency.

It becomes then a function of the Supply Division to keep records of both accomplished and anticipated production, records of shipments directed and shipments made, records of stores received at assembly depots, at

primary and secondary storehouses, at camp depots; records of matériel released for oversea shipment, together with records of when this matériel has been freighted and is on its way to the ports. It is necessary to keep records showing how the requirements of the oversea forces have been met and the ability to meet these requirements in the coming months; records of available storage space and of tonnage requirements both for inland transportation and oversea requirements.

Take the rifle as an example of how the Supply Division keeps in touch with requirements. Once each month a report is received from overseas, setting forth these requirements, the amount on hand at the depots, the amount on hand at the ports and the amount that their records show are on order from the United States. Twice a month the Supply Division receives from the Chief of Embarkation a report of the number of rifles shipped during the past two weeks, the number of rifles at the docks and the number freighted. From his own records the distributing officer knows the number of rifles he has ordered shipped and the number that have been shipped, and can thus check his own records against the report of the Chief of Embarkation as to the number of rifles freighted. The distributing officer knows the number of rifles that he has ordered out from the manufacturer, and the number the inspector of ordnance at the manufacturer's plant estimates will be ready for shipment within the following two or three weeks, the number of rifles which have already been produced and inspected, and the number which have already been shipped. The depots inform him and the records of the Supply Division indicate the number of rifles, both serviceable and unserviceable, at each depot and the requirements for the same, this report being available for each of the 30 general-supply Ordnance depots, and each one of the 32 camp Ordnance depots.

In the beginning the control of the distribution and supply was completely centralized in Washington, all requisitions from camps or departments being passed upon there. Gradually however the Supply Division has come to anticipate requisitions and to carry anticipating stocks at the various depots. In consequence there is today a marked decentralization with a resultant quickening of service, 90 per cent. of the items which are requisitioned being filled at the camp, post or district depot.*

"Cooperite"—A New High-Speed Alloy

Zirkite, a mineral containing zirconium, is now being used to manufacture a new alloy of nickel zirconium called "Cooperite," a new high-speed alloy, according to the London *Iron and Coal Trades Review*. The alloy has a bright, silvery luster and a specific gravity much lower than other alloys used for high-speed work. It contains no carbon or iron, and consequently is not a steel. Its melting point is only about 1150 deg. C., and owing to the alloy remaining in liquid state for a long time before solidifying, difficult castings can be made with ease. No heat treatment is said to be required, the hardness being varied by changing the proportion of the constituents.

*Illustrations marked with an asterisk are copyrighted by the Committee on Public Information. The headpiece and those with a dagger are copyrighted by Underwood & Underwood.

All American ordnance material, no matter where it is made, must pass through an Atlantic seaport before it can go to France. This has resulted in an unprecedented volume of cargo at the seaports and in the necessity of maintaining a chain of warehouses at seaports and further removed from them, and adjusting and regulating the flow of material to avoid congestion and yet be available at a moment's notice.†

THE NAVAL AIR

1, Commander Coburn, and Secretary Daniels

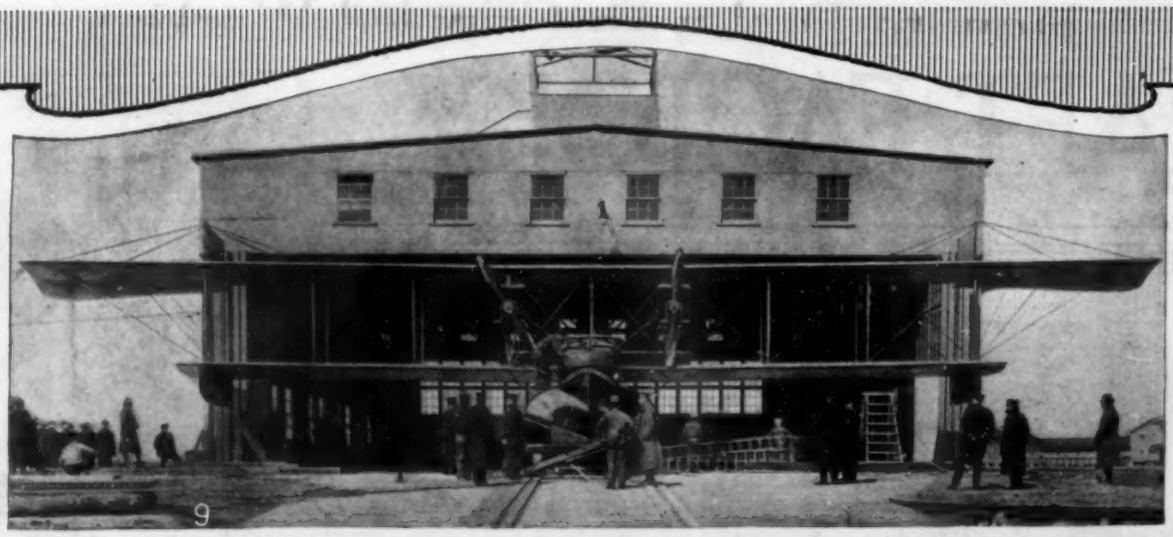
3, A View in the Body Shop

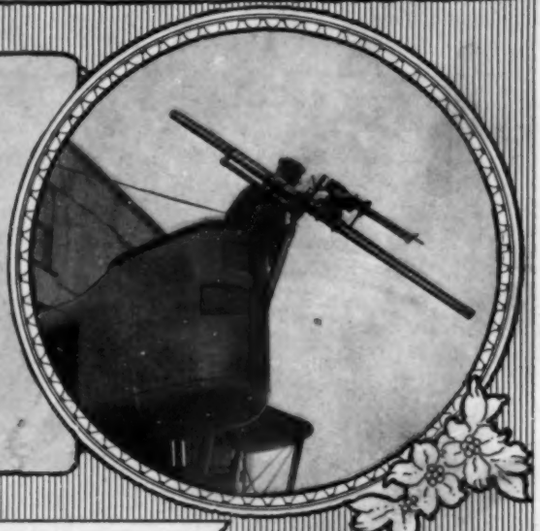
5, Method of Testing Wing-Panel Sections

7, An Experimental Wing-Panel Testing Jig

CRAFT FACTORY

2, Major George R. Wadsworth, Chief Engineer
4, Final Assembly-Plant No. 2
6, Assembly Dept. General View
8, A Corner of the Training School





9, Ready to Go Down Ways.
10, On Cradle, Water Line Showing.
11, Davis Gun in Position.

The Naval Aircraft factory in Philadelphia stands out as an achievement in our war work. It was built and equipped in three months at a cost of about a million dollars, but production was started before all of the building was completed. Early in January, 1918, the naval program was expanded and the Aircraft factory was increased to five times its original size. The extension became an assembling plant for parts made in outside factories and the output was correspondingly increased. The factory employed 3700 people, nearly 1000 of them being women, and it is interesting to note that not over 25 of the whole force had ever worked on airplane work before. There were, however, 80 old master boat builders from the Jersey coast, one the mayor of his town, who did great work on the hulls. Considering that the 40 acres that the plant covers was only a level pasture in July, 1917, the accomplishment of Commander Frederick C. Coburn in converting it into a great production center is all the more creditable. The spirit of the whole undertaking is aptly expressed by the manager's own words in an address to the organization: "Let us make our product so well and so fast that the only reason the public will have for investigating us is to find out how in h—l we do it."

How to Deal with Crippled Workers

By T. NORMAN DEAN, M.A.
Statistician of the Ontario Workmen's Compensation Board, Toronto, Ontario

The reclamation of the crippled from war has drawn attention probably more than anything else to the other phase of the question—the monstrous wastage of life and limb that "peaceful" industry charges up to its maintenance. Deductions from scientific experience in the treatment of the disabled are here suggested to relieve the 2,122,000 industrial cripples at present in the United States.

THE distinction between a handicapped and a crippled worker is that the handicapped man has lost either actual or potential power, while the cripple has lost only actual power—something which he already possessed. The limitation thus placed in defining crippled workers so operates as to set apart those whose power of social functioning has been lessened by purely exogenous forces. These forces are disease, war and accidents, accidents being easily divisible into those the result of the public hazard and those the result of industrial employment. Cripples also readily divide into two main groups—those who are able to pursue their former occupations and those who are unable to do so. This is perhaps the true measure of incapacity from the social side, for if a cripple can engage in his prior occupation and successfully meet the competition of nondisabled workers he is able to produce as much or nearly as much as formerly.

It does not seem possible to hazard an estimate of the number of cripples irrespective of cause in the United States; yet to convey concretely the magnitude of the problem an attempt has been made to adduce conservatively the number of industrial cripples. Without delineating the bases and various assumptions made, or the intricacies of statistical calculation, the figure, shorn bald of all qualifications, is 2,122,000, of whom 600,000 have been so incapacitated as to be rendered in some measure occupationally useless.

The Part of Every Citizen

Every citizen is, as it were, a part of the great economic machine of his country. If he is an efficient part he is adding to the national wealth and maintaining the social prosperity; if he fails in his efficiency he is a dead weight that the rest of the nation must carry and hence lessens instead of adding to the public resources. The subtraction of the producing capacity of half a million or so cripples is not all; there is a further incubus on the nation of uncrippled producers maintaining the crippled nonproducers. In a time of national stress when all productive elements and agencies must be marshaled, the labor power of half a million is not inconsiderable. Furthermore, when the reconstruction of peace inevitably follows the destruction of war, there is an accentuated loss from war cripples added to industrial cripples.

The loss of wages, and of what wages will buy in necessities, comforts and satisfaction; inactivity, moral as well as industrial; cheerlessness and hopelessness of outlook; the physical and mental suffering of the cripple and the changed conditions of his dependents are not conducive to individual well-being.

The pleas for the adequate care of war cripples are not specious arguments. Yet it would require an army of over 43,000,000 continuously in contact with the enemy for a year, or of 4,000,000 for 10 years, to produce the number of industrial cripples unable to engage in their former occupations alive at this instant in the United States alone. Thus, apart from pure sentimentalism, if war cripples as cripples form a national problem, how much more manifest is the problem of industrial cripples? Measured in national terms the question of military cripples is dwarfed by the immensity of the question of industrial cripples, for the future holds vistas of industrial progress of inconceivable magnitude and of the total obliteration and elimination of warfare. War in its terrible intensity has galvanized a materialistic world into some consideration for human wastage.

The Present Problem

The problem then is the restoration of the full producing and earning power of cripples. The measure of national weal is the producing power of the citizens; the measure of individual well-being is, in fact if not in theory, the individual's earning power; the one is the concomitant of the other.

The social movement specifically designated as conservation has its appropriate place in the economic calendar. Conservation is the development of natural resources for the future, natural resources consisting of passive resources, such as land, minerals, fisheries and water powers, and of one active force—industrial man power—the only agency through which passive resources can be transposed into usable product. With conservation runs its twin brother, reclamation—the utilizing of waste. With all of the passive resources and with practically every product manufactured therefrom has come utilization of waste. But the waste dumps of industry still contain the cripples of industry, "unwept, unhonored, and unsung." Rehabilitation is the reclamation of cripples—the converting of the now useless cripples into producers, thereby subserving the national weal and individual well-being.

Scientific rehabilitation, as the result of war experience, connotes adequate medical care, proper prothesis, functional reëducation, vocational training and systems for employment—these from the physical side; and, from the mental side, understanding of psychothenia, sympathetic counseling, patience and tolerance. It follows, as a matter of course, that in order to achieve the ends of rehabilitation a system of pay or allowance must be provided for the cripples and their dependents. The necessary adaptations of these methods to industrial cripples constitute the patent answer to the question, "How to deal with crippled workers?"

The jurisdictional differences must be noted. Under present systems or under present laws it is impossible

for a compensation board to exercise mandatory control of the patient from the time of injury; it is possible, however, to eliminate the inefficient and unscrupulous medical practitioners. Nor is it possible to require a patient to submit to occupational therapy, but it is possible in large industrial centers to make arrangements with hospitals so that occupational therapy be made a part of hospital regimen.

The first thing necessary to a plan of rehabilitating industrial cripples is the appointment of a vocational officer, who should be a man of broad sympathies and good judgment, one conversant alike with industrial processes and human nature. On notification of an accident likely to result in serious permanent disability, this officer should, if possible, interview the injured man and his dependents to provide proper hospital and medical accommodation and a living allowance for maintenance of family, so that the fear of want may be eliminated from the mind of the patient. It is the actual fear of want, of subsequent incapacitation and industrial uselessness, that engenders psychothenia, the poison that creeps into the mind shocked by injury and there allowed to stagnate through long and forced idleness, and psychothenia, even as neurosis, often disables more than injury itself. Any business or financial worries settled on the mind of the patient should be dissipated by sound advice so that surgical recovery can be hastened. The patient should be visited often, his prior occupational record should be studied, and his employer canvased in order to obtain suitable employment.

Status of Compensation

The thought that any service rendered is with the ultimate idea of reducing compensation should not be allowed to germinate. When convalescing time comes, a start should be made toward suggesting new avenues of employment necessitated by injury so that the disabled can become self-supporting. That his power to work can be restored should be the thoughts dominant in the patient's mind; this by the power of suggestion. Naturally the man's desire should be consulted, but he should be impressed gently but firmly with the fact that he must compete with nondisabled workers and so piloted into a sensible and practical occupation. He should be advised further as to the most suitable type of artificial appliance. Employers within the jurisdiction should be canvased for opportunities. It is more than a belief that there is suitable employment for every disabled man provided he be not insane and that he retains some useful faculty. In point of fact such meager statistical data as are available and experience demonstrate that the actual introduction to the new trade should be in the shop or existing institutions for rehabilitation and reëducation. If fitted the man should receive further education in night schools, social-service classes, technical schools or business colleges. Finally, when placed, he should be further encouraged to "carry on" and sympathetic tolerance should overbear his vagaries.

It is manifest that pay and allowances would be necessary. These could be deducted from compensation for temporary and partial disability, without too greatly impairing the amount of compensation for permanent disability and without fear of overpayment.

Objections can be urged, it is true, against such plan —that it is academic in scope, paternalistic in conception and socialistic in execution; that men will not so submit; that employers will not provide employment; that the trade unions would object; that it would cost too much; that it is not practical.

That it may be paternalistic, idealistic, socialistic or academic is beside the point. The fundamental thing is that there is a problem; that that problem requires solution; that it can be solved, and that it can be solved only by action. All the writings or talkings cannot restore one cripple to service unless there be action. That the employers will hire these men is a proved fact —even as a matter of business—if a cripple can compete, and as the employer, through compensation, has already paid him a part of wages surely in return for 100 per cent. labor he is willing to pay a minimum of wages up to a reasonable amount. That men will not submit is not shown to be true by war experience, and even if some of the wastage can be reclaimed something is done. Trade unions will not object if they understand the fundamental conception of rehabilitation, for to do so would defeat some of their own ends. The cost of the scheme is not overwhelming—the services of one or at most two officers, for the number of cripples in any one jurisdiction in any one year is small, and the incidental postage, office and traveling expenses.

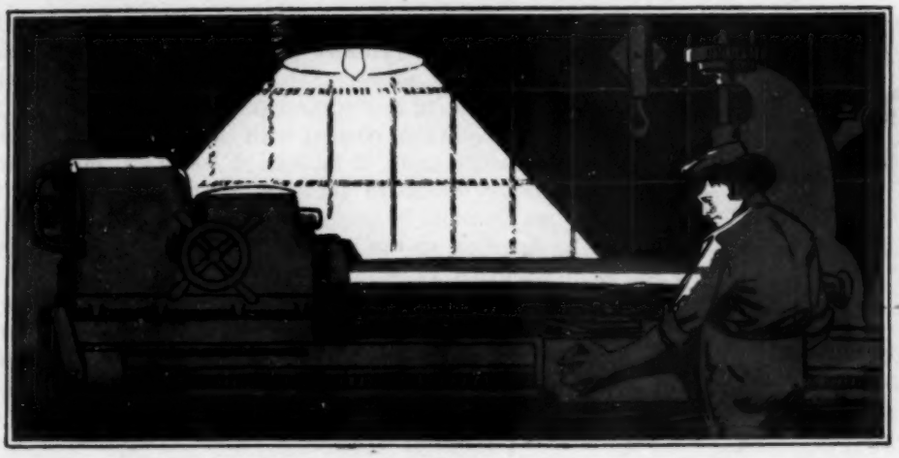
Argument Against Action

In the last analysis the argument against action in restoring cripples to industrial usefulness, in view of the necessity to provide for the added risk by reason of prior disability, is untenable. In the case of jurisdictions which refuse permanent total-disability compensation to a substandard workman who has his remaining earning capacity seriously impaired or wiped out in the accident under consideration, that accident in itself not being severe, the conclusion cannot be supported by the premises. A careful calculation in a jurisdiction which provides for total disability, regardless of whether that disability was incurred in the present or in a previous accident, shows that the average rate over all per hundred of pay roll would be increased by less than one-third of 1 cent in order to meet the added burden necessitated through a humane consideration of facts.

Furthermore, with Canada's four-years-of-war cripples back in the country, the problem of prior disability in relation to subsequent compensation has not become acute nor pressing to the Ontario compensation board. Pennsylvania has a record of 42,111 employment openings in that state for its soldiers, sailors and marines who may return disabled by war service, and it is understood no question of increased compensation liability has become apparent.—From the *Vocational Summary*.

International Trademarks: The Present and the Future

On page 994 a footnote was omitted from the article on "International Trademarks: The Present and the Future," which should have stated that the article was an address delivered at the annual convention of the American Manufacturers' Export Association, Oct. 30-31, 1918.



LIGHT, ELECTRICITY and The Shop

By C. E. Clewell

Instruction for Inspectors in Lighting Practice

During April and May, 1918, the instruction work conducted at the University of Pennsylvania for the state factory inspectors of Pennsylvania and New Jersey in shop-lighting practice marked a new epoch in the administration of factory-lighting codes throughout the United States. This article outlines the steps which led up to this important program of instruction and emphasizes some of the results which may be expected from the point of view of the average shop. It is hoped that the labor departments of other states will follow the example of Pennsylvania and New Jersey, and where this may be the case the notes on the methods followed in this instruction work should prove of special value.

SEVERAL years ago the labor departments of Pennsylvania and New Jersey adopted as a legislative document a shop-lighting code. After these codes had been in force for a year or two it became apparent that the state factory inspectors were being required to supervise a field of inspection which was new and which involved many principles of a kind that were difficult to understand. This situation led the labor departments of Pennsylvania and New Jersey early in 1918 to consider the wisdom of taking steps which would make it possible for their inspection departments to receive systematic instruction in connection with shop-lighting practice which would enable inspectors to estimate the lighting situation in the shops and factories of their districts and thus better equip them to look out for the interests of the shop employees in their territories. To appreciate this move it must be remembered that Pennsylvania and New Jersey, by their adoption of a scientifically prepared shop-lighting code in 1916, were the first to give careful legislative attention to good light as a vital industrial need, and that these states by taking definite steps to train their inspection

FIG. 1. PENNSYLVANIA AND NEW JERSEY SHOP INSPECTORS

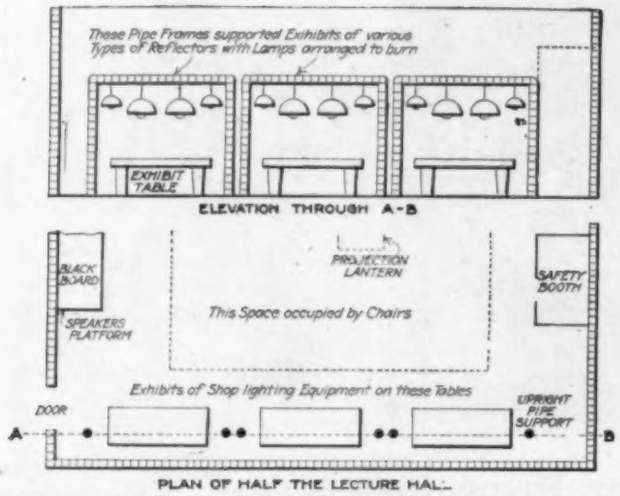


FIG. 2. GENERAL PLAN OF SHOP-LIGHTING EXHIBITS

staffs in the practice of artificial lighting have made a pioneer move forward in this particular field. This movement has not only been a benefit to the two state inspection departments but it is expected that the work accomplished will react in a helpful manner on the working conditions in these two states.

The purpose of the following notes therefore is partly to interest shop employees generally by showing what has been accomplished in the two states mentioned and partly to encourage other states to make similar efforts. Where other state labor departments contemplate an educational movement of this kind this description of how the plan was carried out by Pennsylvania and New Jersey should prove of interest and be valuable as a guide.

It is particularly interesting to record that the arrangements for the instruction work involved in this plan followed requests made in 1918 by the Department of Labor and Industry of the two states to the provost of the University of Pennsylvania. Two quotations from the letters of the commissioners of labor to the university as published in the official public program will show the attitude of the state authorities toward the importance of educational work for their shop inspectors and the great weight they attached to it as a service to the public.

The Pennsylvania Commissioner of Labor and Industry, addressing the provost of the university in March, 1918, said in part: "In an impersonal way I feel safe in saying that this is one of the most important departments of the state, and those of us who are responsible for its administration should utilize every agency whereby we can improve the efficiency of our working force in order to give the fullest measure of service to the public." The Commissioner of Labor of New Jersey, in a similar letter, said in part: "To say that I am highly pleased with the proposed program is indeed expressing it mildly. I feel that this is an opportunity to secure information and data on this work which could be secured in no other way and that the instruction to the men of this department will be of inestimable value."

Following these requests the University of Pennsylvania authorities arranged for two all-day lecture-instruction sessions on Apr. 25 and May 9, 1918, in Philadelphia, at which about 100 state factory inspectors of Pennsylvania and New Jersey were present. Fig. 1 shows a picture of a group of part of the inspectors, which was taken prior to the opening session on Apr. 25.

On the two days mentioned, lectures and demonstrations on factory lighting were conducted in the morning and afternoon, preliminary to which addresses of welcome were made by the provost of the university and by the head of the electrical-engineering department of the university, under whose auspices the work was conducted. The speakers emphasized the willingness of the university to coöperate with the various state departments by placing at their disposal the engineering facilities of the university, and attention was also directed to the great importance of artificial light when many industries are working under pressure due to the war.

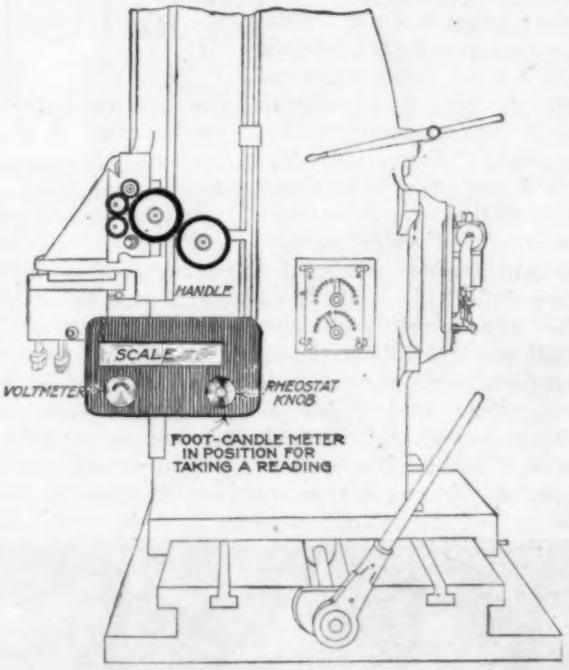


FIG. 4. FOOT-CANDLE METER IN WORKING POSITION

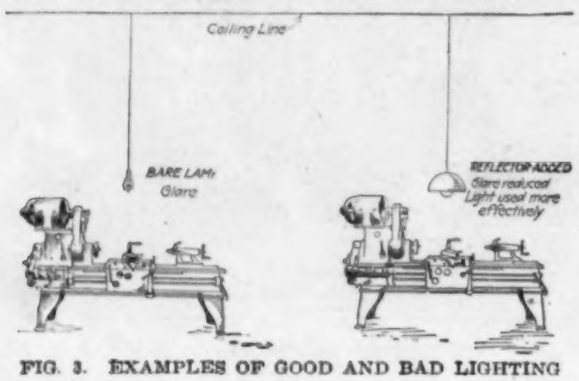
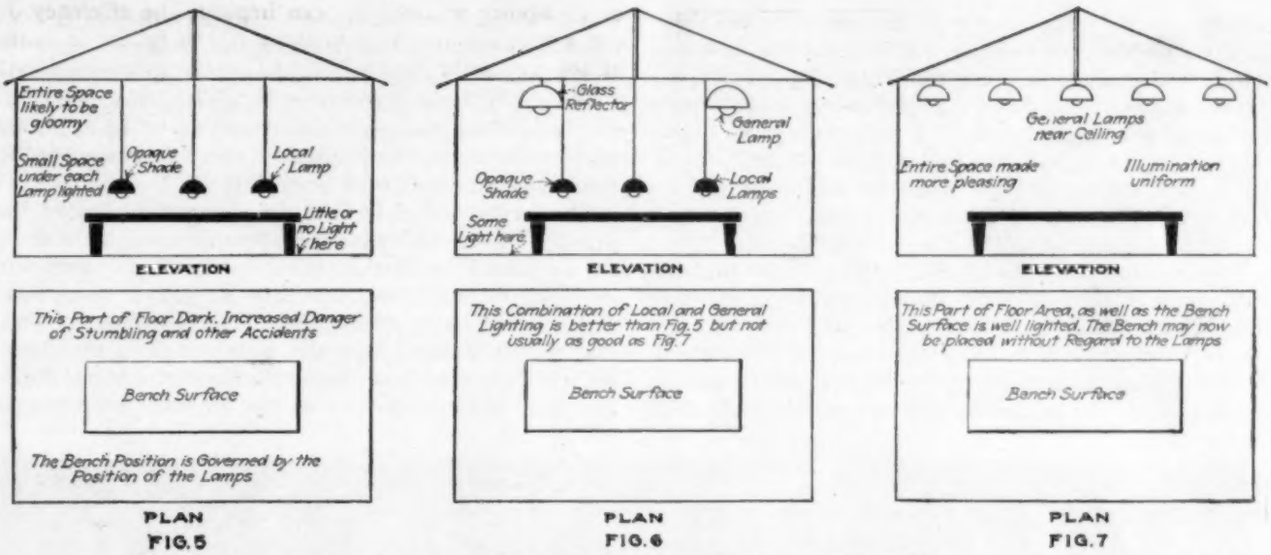


FIG. 3. EXAMPLES OF GOOD AND BAD LIGHTING

An interesting and important feature of the program was an address by G. H. Stickney, president of the Illuminating Engineering Society, in which he outlined the efforts that led to the formulating of factory-lighting codes and their present status throughout the United States. It may here be stated that new shop-lighting codes, which are revisions of the first codes published two years ago, will soon be issued by Pennsylvania and New Jersey.


Entire Space likely to be gloomy
Small Space under each Lamp lighted
Opaque Shade
Local Lamp
Little or no Light here
ELEVATION
This Part of Floor Dark. Increased Danger of Stumbling and other Accidents
Bench Surface
The Bench Position is Governed by the Position of the Lamps
PLAN
FIG. 5
Glass Reflector
General Lamp
Opaque Shade
Local Lamps
Some Light here
ELEVATION
This Combination of Local and General Lighting is better than Fig. 5 but not usually as good as Fig. 7
Bench Surface
PLAN
FIG. 6
General Lamps near Ceiling
Entire Space made more pleasing
Illumination uniform
ELEVATION
This Part of Floor Area, as well as the Bench Surface is well lighted. The Bench may now be placed without Regard to the Lamps
Bench Surface
PLAN
FIG. 7

FIGS. 5 TO 7. THREE DIFFERENT LIGHTING ARRANGEMENTS

Fig. 5—Example of purely local lighting. Fig. 6—Combined local and general lighting. Fig. 7—General lighting scheme

As a result the lectures by a member of the university staff were based on the three outstanding divisions of the new codes in each state, and these divisions include (a) the specification of quantity of light, (b) the relations of glare to factory lighting, and (c) the distribution of light on factory spaces.

At the request of the university a number of prominent concerns in Philadelphia installed exhibits of shop-lighting apparatus as a help to the instruction work. The plan of this exhibit is indicated in Fig. 2. An upright framework of pipe served as a support for modern shop-lighting appliances, both gas and electric, which were arranged to burn between lecture sessions and which were demonstrated by representatives of the various firms. On tables arranged below the framework, Fig. 2, there was a display of special shop-lighting auxiliaries, such as reflectors, various types of lamps and other equipment, including special switches and cutouts.

This exhibit was arranged by the Westinghouse Lamp Co., the General Electric Co., the United Gas Improvement Co., the Philadelphia Electric Co. Supply Department, the Macbeth-Evans Glass Co. and the National X-Ray Reflector Co. The remainder of the exhibit consisted of a well-worked-out display by the safety department of the Philadelphia Electric Co., which consisted of a comparison of good and bad local lighting for two lathes set up for this special purpose in the lecture hall and arranged somewhat as in Fig. 3, and also a specially inclosed booth containing a stairway which was illuminated by lamps controlled by two switches at the entrance. One of these switches controlled a bare lamp, which illustrated the bad practice of using unshielded bright lamps that shine in the eyes of persons using the stairway; the other turned on a lamp equipped with a suitable reflector for illuminating the stairway, at the same time protecting the eyes from the glare.

To anyone familiar with the principles and practice of good shop lighting the purpose of these exhibits in an instruction course of this kind will be apparent. Simple discussion from the lecture platform is not so convincing as an explanation based on something that can be seen in operation, and from this standpoint the importance of having the physical lighting equipment on hand was very great; besides it afforded an opportunity of giving each inspector some practice in handling illumination measurements under conditions corresponding to some extent with those in shop-lighting systems.

In order to bring out the three principal divisions of the revised Pennsylvania and New Jersey codes the lecture session was planned to deal almost exclusively on the afternoon of Apr. 25 with the quantity of light. This lecture treated of the important aspects of this specification to shop-lighting legislation, but considerable emphasis was laid on other features that may be

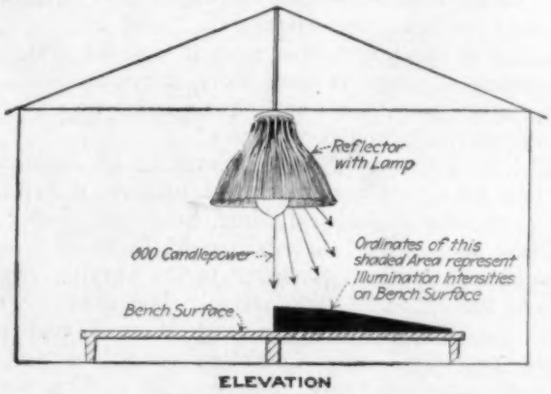


FIG. 8. NONUNIFORM ILLUMINATION

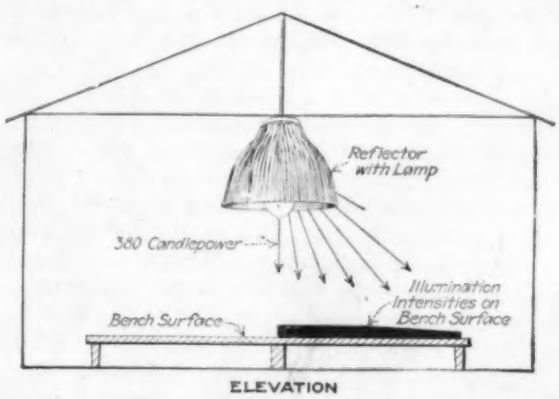


FIG. 9. IMPROVED UNIFORMITY IN LIGHTING

looked upon as being even more important to the shop-lighting problem as a whole. Attention was called to the fact that light is a matter which depends on the physiological side of the eye as well as upon the simple matter of quantity of light; in other words, one lighting system which had exactly as much intensity of illumination on the work as another might be far inferior to it because of the harmful effect on the eyes caused by excessive glare.

This session closed with some pointers on the new foot-candle meter, a device that records quantity of light in an easily readable manner and one of great practical importance in shop lighting. Dr. Clayton H. Sharp of New York, the inventor of this device, gave a short talk on the principles and the methods of using the instrument, after which the inspectors separated into three groups, to each of which was assigned one of these instruments and an instructor who explained its use and gave each a chance to take one or more readings. This laboratory, or practical, side of the lecture proved most valuable, and particularly so in the use of the foot-candle meter in a working position as suggested, for example, by Fig. 4.

Two weeks after the sessions of Apr. 25 the inspectors of the two states assembled for work in the relations of glare to factory lighting and on the distribution of light in shop spaces. Prior to the morning session proper Robert F. Pierce of the Welsbach company, Gloucester City, N. J., addressed the group on the practical aspects of gas appliances for shop lighting, emphasizing the fact that experiments prove the success of gas for such purposes, and pointing out that the several older objections to gas as an illuminant were generally nothing else but prejudices. He stated that recent developments in pilot lamps promised to solve the problem of gas-lighting ignition, and outlined in an instructive manner the constructive work which has been done by the Illuminating Engineering Society and especially that of its Committee on Lighting Legislation under the chairmanship of L. B. Marks of New York, on the basis of which the new codes in the two states had been possible.

The lecture on glare included demonstrations of the greatly increased brilliancy of modern light sources in comparison with that of the older illuminants and the use of translucent reflectors, or globes, for reducing this excessive brightness. The question of local and general lighting was also discussed from the standpoint of glare and on the advantages of general lighting, Fig. 7, in comparison either with the combination of general and local lighting, Fig. 6, or the purely local scheme, Fig. 5.

FIG. 10. NIGHT VIEW ILLUSTRATING POSSIBILITIES OF MODERN SHOP LIGHTING

It is generally conceded that the avoidance of glare in modern shop lighting is one of the most important points that should receive attention. In fact if one may judge from the widespread use of bare lamps close to machine tools immediately in front of employees engaged on bench and other work it is probable that the avoidance of glare is even more important than the other requirements of the lighting codes now in force in Pennsylvania and New Jersey.

The final session was given over to an explanation of how to secure a more or less uniform distribution of light under practical shop conditions under the general subject of "Distribution of Light in Factory Spaces." Attention was given to the varying requirements for uniform illumination. The drafting room was cited to show that the work there is such as to make perfectly uniform lighting conditions desirable over the drawing board, with very little or no shadow

effect, and this case was contrasted with certain other classes of work, as in fitting die forms in the finishing process of die making, where perfectly uniform lighting is sometimes very poor. In the latter case, a hand lamp of an extension line is sometimes better than the sole use of a general overhead system of lighting in spite of its excellence for almost all other needs of vision.

Other phases of uniformity discussed were adequate illumination of the entire floor area of a shop so that the position of work need not be dictated by the necessity of placing it under a certain drop lamp, and the relation of nonuniform lighting conditions to accident risk, as factory sections which have merely local lighting consisting of bright spots of light under individual drop lamps, with the remainder of the floor space in relative darkness, impose on employees the necessity of finding their way between benches or machinery and increase their likelihood of stumbling, owing to poor light, in contrast with shops that have their passages liberally illuminated.

Finally, the use of the foot-candle meter was again mentioned as a convenient and inexpensive means of measuring illumination at all points of a shop-floor area by determining the amount by which dark spaces are less illuminated than those more nearly under lamps. In other words, the advantages of this instrument, as illustrated in Fig. 4, were shown to apply equally well to the detection of more or less uniform lighting conditions.

From the practical side of shop-lighting systems probably no more important point was taken up than that of the proper use of reflectors with modern electric and gas lamps. Special mention was made of the great differences which occur in the distribution of light about a lighting unit by the simple change from one type of reflector to another, a point well illustrated in Figs. 8 and 9. In Fig. 8 a single lighting unit is shown (assumed to be a 200-watt Mazda C electric lamp) for illuminating the bench extending nearly all of the way across the shop aisle.

The only difference between Fig. 8 and Fig. 9 is in the type of reflector employed, as the lamp is of the same type and size in each case. In Fig. 8 the distribution of light about a so-called "intensive" prismatic reflector is shown, the length of the arrows away from the lamp unit in each case representing, to a certain scale, the candle power in that direction.[1] The ordinates of the shaded area directly above the right half of the bench surface show that the illumination intensity at the center of the bench is high and that it rapidly falls off to a very low relative value near the end of the bench.

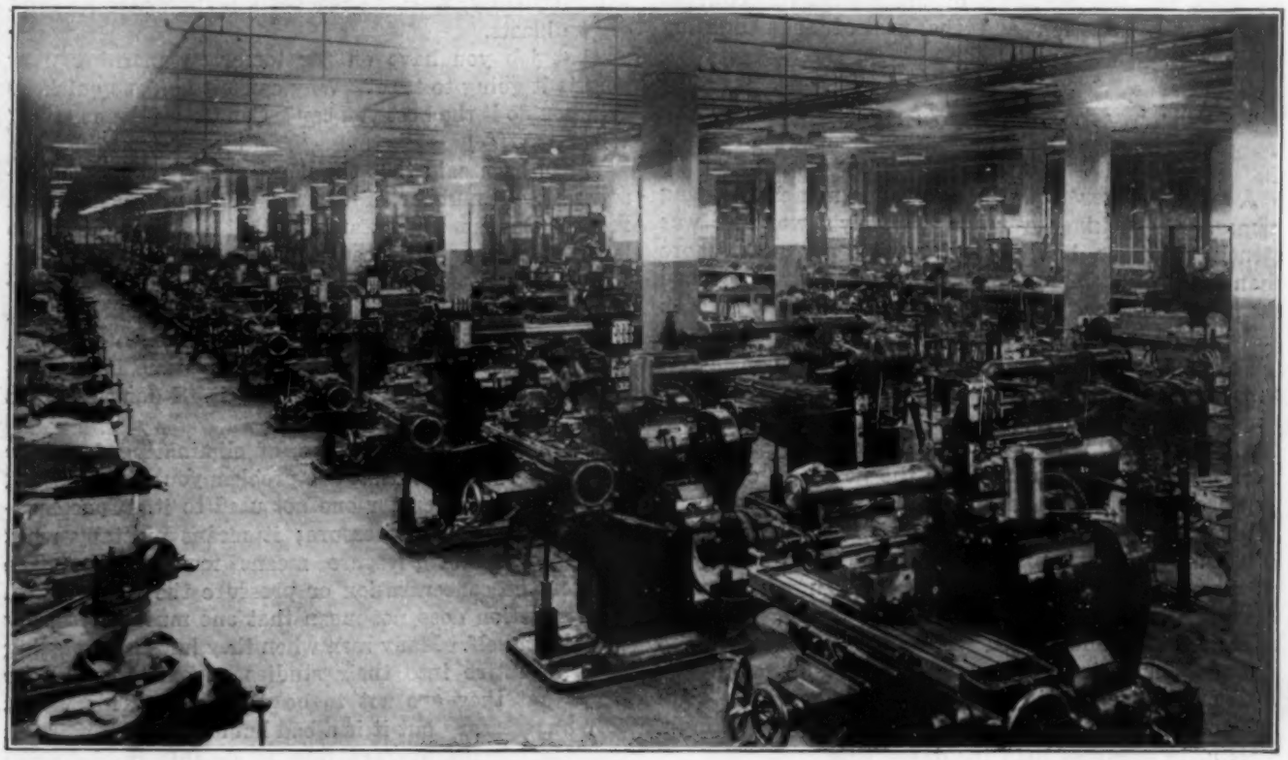


FIG. 11. EXCELLENT RESULTS SECURED WITH MODERN LIGHTING EQUIPMENT

Fig. 9 shows the same lamp equipped with a so-called "extensive" prismatic reflector, which spreads the light over wider angles. It will be noticed that the ordinates of the shaded portion in this case are much more nearly uniform than those in the preceding diagram. A comparison of Figs. 8 and 9 will show that although the intensity of illumination directly under the lamp is higher in Fig. 8 than in Fig. 9 the latter diagram represents a fairer condition for the workmen who may be distributed along the bench in their routine work. In this connection the exhibits arranged along the walls of the large lecture room proved of unusual value, and references to actual equipment could thus be made as the instruction talks progressed. In several instances

[1]The distribution for the right half only is shown since the candle-power values on the two sides of the lamp at any given angle with the vertical are assumed to be the same in each case.

lantern slides as well as photographs somewhat like the halftones Figs. 10 and 11 were employed to bring out special points of the lectures.

Concluding Note

The foregoing notes have set forth the methods followed in the instruction work especially arranged for inspectors upon whom largely rests the responsibility of seeing that the needs of the average shopman is cared for in the matter of shop lighting. The effort was a pioneer one in this field, and much credit is due to the labor departments of Pennsylvania and New Jersey for their liberal and progressive attitude in the matter. I believe that the above items regarding modern shop lighting, which were considered important for state shop inspectors to know, constitute excellent suggestions for the shopman or shop manager both as regards the selection and the use of shop lighting equipment.

How to Raise Your Salary

By A. Schleimer

A manufacturer employed two young men for copying names. On looking over the first day's work he was struck that one had done fully 30 per cent. more than the other. Being new employees he naturally had them under his eye for the first day and knew that both had worked industriously.

Both were to all intents and purposes equal in intelligence, and he was at a loss to account for the difference, as neither had had experience at this kind of work. Curious to know where the difference lay he gave their work considerable attention for the next few days and by close observation he soon perceived the reason.

When they started copying the lists they simply looked at a name and then copied it. Before long, however, one of them saw the advantage of memorizing more than one name before copying, and made a practice of memorizing three names, then writing them. It took him longer to memorize three names than it did one, but the total time of memorizing and writing was much less than if he copied them singly, and each day he was making a little more progress than the day before.

It is easy to see that his earning capacity was greater than his companion's, and as he did this of his own initiative it was safe to assume that he would apply the same methods to any other job he might be given.

Chances of Promotion

Which of the two stood the better chance of promotion? How about your own particular job? Are you doing it the same today as you were when you first got it? Have you found any method of doing it just a little better than it was done before? Look it over. There's a way to improve it. Study it, pick it apart. It's there—covered up perhaps, but it exists, and it's up to you to find it.

Every vocation and line of endeavor is laid down along certain grooves, mostly the outcome of custom. Routine work is nothing but a rut. It is the man who gets out of this rut, getting results more quickly and easily, who makes headway. It takes 5 hours to travel from New York to Washington. If some engineer were to claim that he could shorten the time 15 minutes under present conditions he would get a hearing instantly. If he proved that he could do it he would step into the front ranks. I am not an engineer; I don't know whether it is possible or not. But this much history assures us: the accomplishment of many so-called impossible tasks have made many men great. They pitied Columbus, they laughed at Fulton, and there were many that thought Professor Langley was crazy. But these men did big things, and all big things are composed of little things, and many a man who had a seemingly insignificant, unimportant job has by his own individuality made it a larger and more important one.

Getting Beneath the Surface

When a miner goes prospecting he is not satisfied with the appearance of the surface, but he digs beneath; and frequently, when he reaches a point where he can't dig he blasts.

That job you have on for tomorrow morning, how long is it going to take? Why can't it be done quicker? Will you do it the best you can? Can't it be done better? Why?

It has been said that the new Liberty motor was designed by a number of experts who were locked in a room with the understanding that they were not to leave until they produced something. I cannot vouch for this story, but this much is evident: the new motor is the greatest that has ever been produced in its line.

Any man, no matter what his degree of intelligence, can do better than his average at any time by concentrating his mind on his work. Try it. I don't say it is easy—it isn't.

The habit of concentration, of eliminating from the mind everything but that one problem you wish to solve, is a difficult matter for one not used to it. Concentration is force; it is pressure; it means mentally what water or steam pressure means mechanically. The greater the concentration or pressure the more power. Concentration does not mean that one must necessarily seclude oneself. Many men when they have a perplexing problem retire into their studies or offices and leave word that they are not to be disturbed. This is not only unnecessary but it is a bad habit. Besides it is not possible for the average man to do this in the usual run of business.

Overcome Bad Working Conditions

Put your mind on your problem, irrespective of what is going on around you, and after a while you will be able to do your work under conditions that would drive the ordinary man to distraction. You will be surprised to find how much more you can see in what appears to be an ordinary problem. Take your own work; study it. Cut it here, shorten it there; see how much of it is useless repetition. Spend a day, a week if necessary, on it; its worth it. Others have done it—are doing it. Your job today is probably an insignificant part of a large organization. Make it bigger, more important. You can do it.

When you cut out the dead wood somebody is going to wonder how it is that you are doing the work in much less time than it took the man before you. Put the time you have spent envying the other fellow in your own job. You may be standing on a gold mine and do not know it.

How the 155-Mm. Howitzer Is Made—III

By J. V. HUNTER
Western Editor *American Machinist*

This article covers the process of shrinking the howitzer jacket on the tube and some operations on the howitzer body after this has been completed. In spite of the greatest care used in boring the jacket and cutting the thread for reception of the tube, discrepanices will occur in obtaining exact dimensions. These discrepancies, while only a few thousandths of an inch, are too great to permit the use of one standard size of tube.

FOR shrinking on the jacket the tube must be 0.011 in. larger than the bore of the jacket at all points except on the end section *B* to *A* in Fig. 33, between which points the greater diameter of the tube tapers off from 0.011 into 0.006 inches.

After final finish-boring the jacket operation 5 calls for inspection and gaging for shrinkage and also for bore-search for defects in the material. This work is handled in one of the side bays of the shop, Fig. 34, the heating pits for the shrinking operation being plainly discernible along the windows at the right. The jackets and tubes undergoing inspection occupy most of the floor space in the foreground.

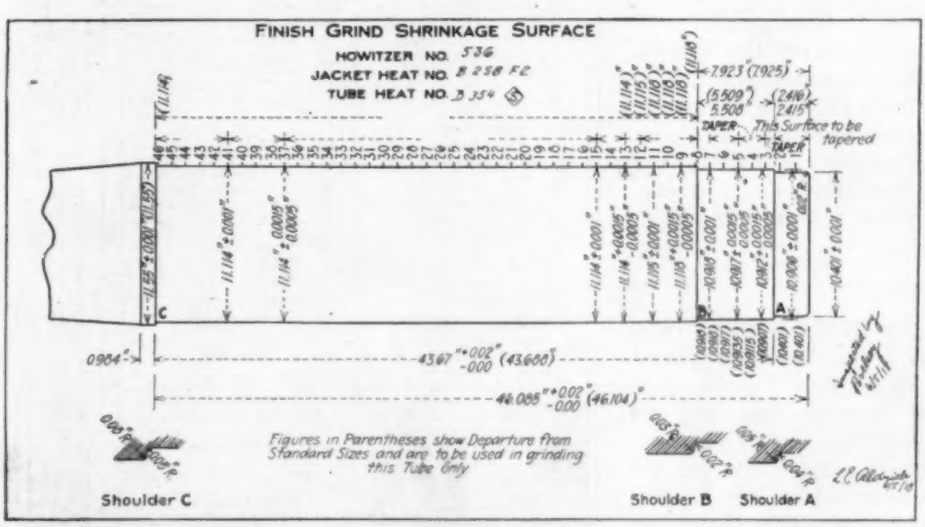
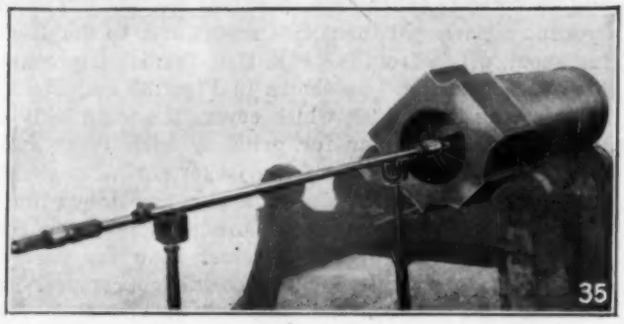

FINISH GRIND SHRINKAGE SURFACE
HOWITZER NO. 536
JACKET HEAT NO. B 258 FE
TUBE HEAT NO. B 354
TAPER
This Surface to be tapered
Figures in Parentheses show Departure from Standard Sizes and are to be used in grinding this Tube Only
Shoulder C
Shoulder B
Shoulder A

FIG. 33. SHRINKAGE DRAWING SHOWING TUBE-GRINDING DIMENSIONS

The jackets are subjected to a rigid inspection and star-gaging of the bore for each inch of length. The star gage used for this operation, Fig. 35, is accurate within 0.0005 in. This gaging is all recorded in triplicate on the form blank illustrated in Fig. 36, which it will be noted is taken from howitzer No. 536. The inspection department turns this report over to the drafting room, which from the data thus furnished prepares the "tube drawings" as shown in Figs. 33 and 37.

Referring to Fig. 33, which covers the main body of the tube, the diameter for grinding each inch of its length within the limits of the jacket shrink is clearly indicated as well as the allowable plus and minus limits for each point. These dimensions as here given contain the necessary oversize greater than the bore of the jacket to provide for the shrinkage compression. The distance between the shoulders *A* and *B* is very important and must be held to close limits of tolerance. Equally close work must be done in cutting the threads and shoulders where the tube is screwed into the jacket. These dimensions are accurately covered by the drawing, Fig. 37, which is furnished the operator in making up each individual tube. In this operation the closest work is required between the sides *A*, *B* and *C* of the threads, and the shoulder *D* at the breech end of the tube. This provides the necessary compressive set between these respective points to seat the tube firmly longitudinally in its jacket. The compression between the points *A* and *D* is 0.0065 in. with a tolerance of 0.0005 in. Referring to Fig. 33 it will be noted at points 3 and 4 that a "taper" is called for; this must be a true and not a "stepped taper." In grinding this the face of the wheel is dressed to the proper angle to produce this taper. In cases requiring a long taper the table must be set over.

After the tube for each individual jacket has been inspected by both the company and Government inspectors it is "released to shrink." This inspection is as thorough as that conducted on the jacket, and not only includes the calipering of the outside diameters and threads but also a careful star-gaging of each inch of the bore. The form for the inspection sheet covering this work



FIGS. 34 AND 35. SHRINKING SHOP AND STAR GAGE
Fig. 34—General view of shrinking department. Fig. 35—Star gage for the jacket

as performed on the ouside of the tube is shown in Fig. 38, its respective columns indicating the computed proper diameters and the actual measured diameters of the tube. The inspection sheet calls for a "cone" at points 3 and 4 where the drawing had specified a taper; this insures that the inspector has examined to guard against a "stepped taper."

Star-gaging the bore before and after the shrinking operations is covered by the inspection sheet, Fig. 39. The compressive effect exerted by the shrinkage of the jacket must reduce the diameter of the tube by an amount not less than 0.003 in. This is a measure of the effectiveness of the shrinking operation, and the gaging of the bore after "shrink" is recorded and compared by both sets of inspectors.

The Heating Pit

After the tube and jacket are finally released from inspection ready for "shrink," the latter is placed for heating in the electrically heated pits, Fig. 34. The operation of lowering one of these jackets into the heating pit is shown in Fig. 40. The jackets are handled by means of a collar with two trunnions for the crane chains; this is clearly illustrated in Fig. 41. The collars are quickly attached and removed by the wedge clamp seen at the right of the collar.

The interior of the pit is lined with heavy electrical resistance coils, which may be seen in Fig. 40. The controlling mechanism for these electric heating units is a bank of pyrometers and the heating results obtained are very accurate, the constant recording diagram showing a fluctuation of only 5 deg. F. after the jacket has been brought up to a temperature of 800 deg. F., which is the proper temperature for shrinking. If the jacket is placed in a cold furnace a heating period of approximately six hours is required, but when the furnace has previously been brought up to temperature this heating period will not be more than three hours.

During the period when the jacket is heating, the tube is made ready for its share in the shrinkage operations by fitting watertight plugs in both muzzle and breech ends. The muzzle plug is clamped on the muzzle ring, so that the tube may be suspended vertically from that end and it has two 1-in. water pipes extending through it with hose connections on the outside. One of these pipes is of sufficient length to almost reach the bottom plug, and carries fresh cold water to maintain the coolness of the tube during the shrinking period. The other pipe is for flow off.

Moving the Tube

The tube is suspended by the muzzle over the shrink pit as shown in position over a jacket in Fig. 42. The raising and lowering of the tube is controlled by an air hoist. Handles are clamped in position for turning the tube in the jacket until it screws down on its shoulders.

When the jacket is lifted from the heating pit an inspector instantly gages its bore with a set-limit star gage to insure that it has expanded sufficiently to pass over the tube. A workman with a cloth ball swab on a pole instantly cleanses the bore from any dirt and the jacket is again lowered into the shrinking pit. The tube is then swung into position and lowered until the threads catch. The two workmen seen in Fig. 43 have just run around with the turning handles until the shoulders have set together with a thud.

ORIGINAL BORE OF JACKET

155 M/M HOWITZER 536 MODEL 1918 HEAT NO. B 258 F 2

INCHES FROM BREECH	DIAMETER OF BORE ⌀	⌀	MEAN
Set	10.9927		
0	+.0005	+.0005	10.9942
1	+.0005	"	"
2	"	"	"
2 415		+.0005	"
Set	10.9958		
2 415	-.0055	-.005	10.9903
3	+.001	+.001	10.9965
4	"	"	"
5	"	"	"
6	"	"	"
7	+.0015	+.0015	10.997
7 923	"	+.0015	"
Set	10.9958	"	"
7 923		"	"
8		"	"
9		"	"
10		"	"
11		"	"
11 350		"	"
Set	11.1025	"	"
11 350	+.0025	+.0025	"
12	+.001	+.0015	11.1037
13	+.0005	+.0015	11.1035
14	"	.0015	"
15	+.0005	"	11.103
16	+.0005	.0005	"
17	"	"	"
18	"	"	"
19	"	"	"
20	"	"	"

INCHES FROM BREECH	DIAMETER OF BORE ⌀	⌀	MEAN
21	+.0005		11.103
22	"		"
23	"		"
24	"		"
25	"	+.001	11.1032
26	"		"
27	"		"
28	"		"
29	"		"
30	"	+.001	"
31	"		"
32	"		"
33	"		"
34	"		"
35	"	+.001	"
36	"		"
37	+.001		11.1035
38	"		"
39	"		"
40	"	+.001	"
41	+.0005		11.1032
42	"		"
43	"		"
44	"	+.001	"
45	"	+.0005	11.103
45 309	"	+.0005	"
Set	"		"
45 309	11.539	11.5385	11.5387
46	"	"	"
46 693	11.539	11.539	11.5392
47			

Width of Grooves	.791
Width of Lands	.735
Top of Threads	10.9975
Bottom of Threads	11.1075
Top to Bottom of Threads	11.0075
Depth of Threads	.100
Bars Inserted	Bore plane

Exterior Measurements Before and After Shrinkage

	BEFORE	AFTER
Dia. Breech Spot	16.630	
Dia. Center Spot	16.562	
Dia. Muzzle Spot	16.2805	
Distance Between Punch Points	32.000	

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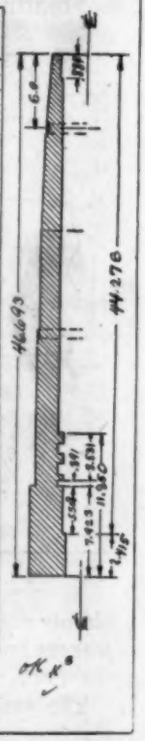


OK N°

FIG. 36. RECORD OF STAR-GAGING THE JACKET

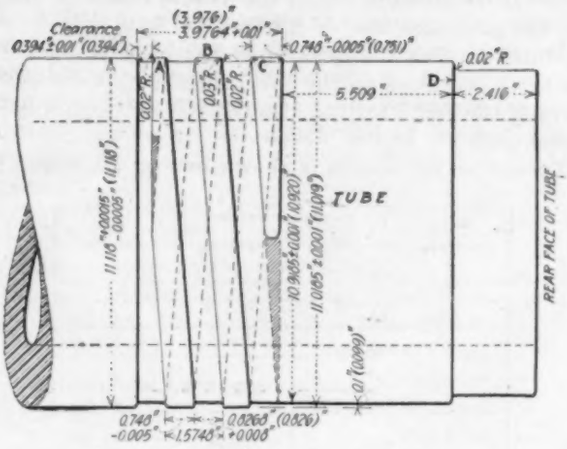
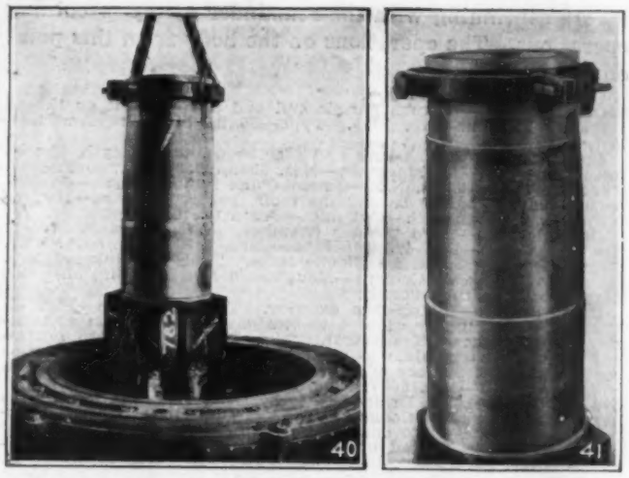


FIG. 37. SHRINKAGE DRAWING SHOWING THREAD-CUTTING DIMENSIONS



FIGS. 40 AND 41. HEATING FOR SHRINKAGE AND ARRANGEMENT FOR ATTACHING SLING

Fig. 40—Lowering the jacket into the furnace. Fig. 41—Split collar with trunnions for the hoisting sling

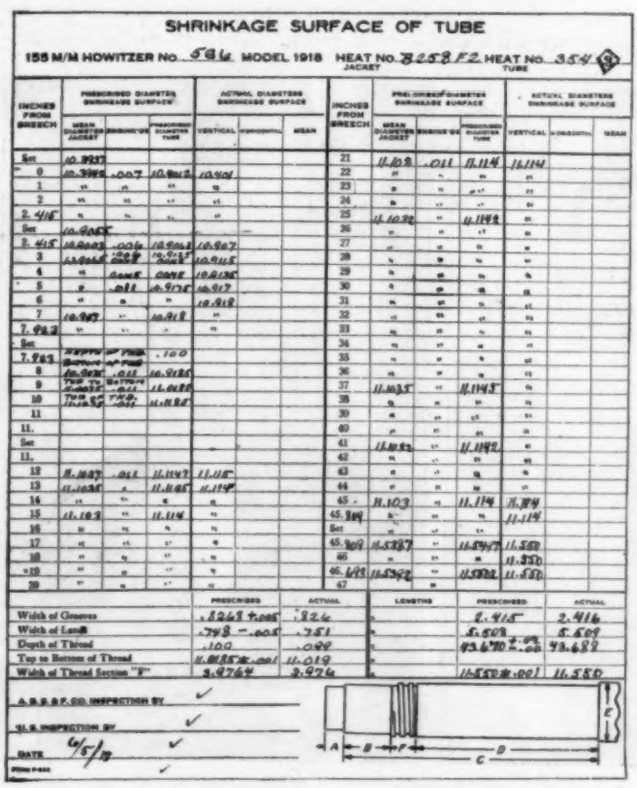
Instantly a heavy stream of water is thrown onto the base of the jacket from the perforated pipe coils, plainly distinguished. This cools and sets the base where the shoulders previously described are located. The upper portion of the jacket has still sufficient play to draw down as it cools. The total shrinkage in the length of the jacket is approximately 0.270 inches.

The perforated water ring is gradually raised until it reaches the point shown in Fig. 44, and after 20 min. flow is shut off. The operation of shrinking is done with great rapidity and dispatch and has been accomplished in 40 sec. from the time the furnace was opened until the instant when the cooling water was turned on, although under ordinary circumstances this period will be about 1 minute.

The shrinkage record sheet shown in Fig. 45 gives all the data upon the one particular howitzer which we have been following through this operation.

After the assembled jacket and tube are removed from the shrinking pit they are laid on trestles until thoroughly cold. Then the gun is inspected for the inside-bore shrinkage, and when passed is released to the shop for further operations.

The assembled jacket and tube, now known as the "howitzer body," are subjected to a most complete inspection to detect any faulty material or workmanship


SHRINKAGE SURFACE OF TUBE

155 M/M HOWITZER No. 586 MODEL 1918 HEAT No. B258 F2 HEAT No. 354 (S)
JACKET TUBE

INCHES FROM BREECH	PRESCRIBED DIAMETERS SHRINKAGE SURFACE			ACTUAL DIAMETERS SHRINKAGE SURFACE			INCHES FROM BREECH	PRESCRIBED DIAMETERS SHRINKAGE SURFACE			ACTUAL DIAMETERS SHRINKAGE SURFACE		
	MEAN DIAMETER JACKET	ALLOWANCE	PRESCRIBED DIAMETER TUBE	VERTICAL	HORIZONTAL	MEAN		MEAN DIAMETER JACKET	ALLOWANCE	PRESCRIBED DIAMETER TUBE	VERTICAL	HORIZONTAL	MEAN
Set	10.9937						21	11.109	.011	11.114	11.114		
0	10.9982	.007	10.9912	10.991			22	"	"	"	"		
1	"	"	"	"			23	"	"	"	"		
2	"	"	"	"			24	"	"	"	"		
2.416	"	"	"	"			25	11.1092	"	11.1142	"		
Set	10.9955						26	"	"	"	"		
2.415	10.9993	.006	10.9943	10.987			27	"	"	"	"		
3	11.0068	.008	10.9988	10.995			28	"	"	"	"		
4	"	.0065	.0055	10.9935			29	"	"	"	"		
5	"	.011	10.9735	10.967			30	"	"	"	"		
6	"	"	"	10.978			31	"	"	"	"		
7	10.997	"	10.987	"			32	"	"	"	"		
7.983	"	"	"	"			33	"	"	"	"		
Set							34	"	"	"	"		
7.983			.100				35	"	"	"	"		
8	10.9982	.011	10.9882				36	"	"	"	"		
9	11.0082	.011	10.9982				37	11.1092	"	11.1142	"		
10	11.0182	.011	11.0082				38	"	"	"	"		
11							39	"	"	"	"		
11.							40	"	"	"	"		
Set							41	11.1092	"	11.1142	"		
11.							42	"	"	"	"		
12	11.1087	.011	11.1147	11.115			43	"	"	"	"		
13	11.1087	"	11.1147	11.114			44	"	"	"	"		
14	"	"	"	"			45	11.103	"	11.114	11.114		
15	11.103	"	11.114	"			45.309	"	"	"	11.114		
16	"	"	"	"			Set	"	"	"			
17	"	"	"	"			45.309	11.5287	"	11.5397	11.538		
18	"	"	"	"			46	"	"	"	11.538		
19	"	"	"	"			46.691	11.5342	"	11.5392	11.538		
20	"	"	"	"			47	"	"				

	PRESCRIBED	ACTUAL	LENGTHS	PRESCRIBED	ACTUAL
Width of Grooves	.1245 +.005	.1246		2.415	2.414
Width of Lands	.748 -.005	.751		5.509	5.509
Depth of Thread	.100	.099		93.670 +.05 -.05	93.689
Top to Bottom of Thread	11.0185 ±.001	11.019			
Width of Thread Section "F"	2.9764	2.9764		11.550 ±.001	11.550

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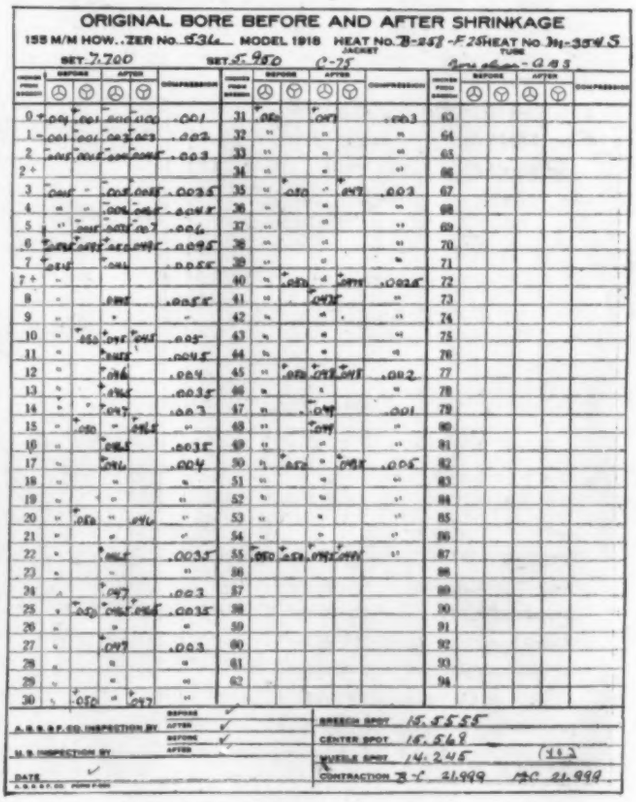
DATE 4/5/19 ✓

FIG. 38. RECORD OF GAGING OUTSIDE DIAMETERS OF TUBE


ORIGINAL BORE BEFORE AND AFTER SHRINKAGE

155 M/M HOW. ZER No. 536 MODEL 1918 HEAT No. B-258 - F2 HEAT No. 354.S
JACKET TUBE

SET 7.700 SET 5.980 C-75 Gun Mun - G 83

INCHES FROM BREECH	BEFORE	AFTER	COMPRESSION	INCHES FROM BREECH	BEFORE	AFTER	COMPRESSION	INCHES FROM BREECH	BEFORE	AFTER	COMPRESSION
0	.004 .001	.004 .001	.001	31	.002	.004	.003	63			
1	.001 .001	.002 .002	.002	32	"	"	"	64			
2	.004 .004	.004 .004	.003	33	"	"	"	65			
2+				34	"	"	"	66			
3	.004 "	.004 .004	.0035	35	" .010	" .007	.003	67			
4	" "	.004 .004	.0045	36	"	"	"	68			
5	" "	.004 .004	.004	37	"	"	"	69			
6	.004 .004	.004 .004	.0045	38	"	"	"	70			
7	.004	.004	.0055	39	"	"	"	71			
7+				40	" .002	" .0011	.0028	72			
8	"	.004	.0055	41	"	.002	"	73			
9	"	"	"	42	"	"	"	74			
10	" .002	.004 .004	.005	43	"	"	"	75			
11	"	.004	.0045	44	"	"	"	76			
12	"	.004	.004	45	" .002	.003 .003	.002	77			
13	"	.004	.0035	46	"	"	"	78			
14	" "	.003	.003	47	"	.004	.001	79			
15	" .002	" .004	"	48	"	.004	"	80			
16	"	.004	.0035	49	"	"	"	81			
17	"	.004	.004	50	" .002	" .003	.005	82			
18	"	"	"	51	"	"	"	83			
19	"	"	"	52	"	"	"	84			
20	" .002	" .004	"	53	"	"	"	85			
21	"	"	"	54	"	"	"	86			
22	"	.004	.0035	55	.002 .002	.003 .004	"	87			
23	"	"	"	56				88			
24	"	.003	.003	57				89			
25	" .002	.004 .004	.0035	58				90			
26	"	"	"	59				91			
27	"	.003	.003	60				92			
28	"	"	"	61				93			
29	"	"	"	62				94			
30	" .002	" .003	"								

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U. S. INSPECTION BY — BEFORE ✓ AFTER

BREECH SPOT 15.5555
CENTER SPOT 15.568
MUZZLE SPOT 14.245 (14.3)
CONTRACTION B-C 21.999 MC 21.999
DATE ✓

FIG. 39. GAGING RECORD OF BORE BEFORE AND AFTER SHRINKAGE

before continuing with the remainder of the machining operations. The operations on the body from this point on are as follows:

Operation 14.—Inspection.

Operation 15.—Re-turn muzzle end and true-up spot on thread surface. Machine—No. 5009. Type—36 in. by 18 ft. American lathe.

Operation 16.—Finish-bore and face breech to a length. Transformation—Fig. 46. Machines—Nos. 5029, 5030, 5031, 5032, 5033. Type—38 in. by 32 ft. Niles-Bement-Pond lathes. Tools—Finish-boring reamer, boring bars, lathe tools, gages. Coolant—Houghton's No. 2 cutting oil. Cut data—Same as tube boring.

Operation 17.—Bore powder chamber, gas-check seat, breech. Transformation—Fig. 47. Machines—Nos. 5034, 5035, 5036, 5037. Type—38 in. by 32 ft. Le Blonde lathe. Tools—Boring reamers, boring bars, gages. Coolant—Houghton's No. 2 cutting oil. Cut data—Same as tube boring.

Operation 18.—Finish-turn exterior. Transformation—Fig. 48. Transfer heat number of tube to straight-turned section at muzzle end of jacket. Transfer heat number of jacket to muzzle and as close as possible to straight-turned section of tube concentric with the surface of tube, and reading as from the breech end. Machines—Nos. 5007, 5008, 36 in. by 18 ft. LeBlond lathe; 5065, 32 in. by 15 ft. Bridgeford lathe. Tools—Lathe tools, snap gages, length gage. Coolant—1 to 12 solution Damascus compound. Cut data—Two cuts, speed 20 to 35 ft., feed $\frac{1}{16}$ in.

Operation 19.—Thread breech recess and face to length. Machines—Nos. 5043, 5046, 5047, 5048, 5050. Type—27 in. by 16 ft. Reed-Prentice lathes. Tools—Lathe tools, thread-cutting tools, gages. Coolant—A small amount of cutting oil.

The preceding operations complete a large portion of the lathe work on the body. In boring operation, in Fig. 49, the boring head is shown just after it has begun to enter the body.

Lubrication in Boring

In all the boring operations cutting oil is flooded through the boring head onto the cutter blades in a heavy stream under a pressure of from 35 to 100 lb. and the volume of oil thus used is great, being all that two $\frac{3}{8}$-in. pipes will convey. Each lathe is provided with an individual 4½-in. by 5-in. triplex motor-driven pump for its cutting-oil supply. The oil-feed line from the pump is provided with a bypass valve to maintain a constant pressure by bypassing the surplus oil back to the reservoir.

The reamer used for the powder chamber has a long, tapered slope on the forward end of its cutting edge, this tapered edge leaving what is known as the "forcing slope" at the forward end of the powder chamber. Reaming the gas-check seat is finished by hand.

Finish-turning the exterior of the body is similar to the same operation on the tube, care being exercised in turning the spots for the steadyrests for threading the breech end.

Threading the breech is shown in Fig. 50, where the gages used for the thread may be seen on the tool bar, and the plug gage for testing the thread is on top of the breech end of the body. There is a very small amount of leeway in determining the point from which the thread shall be started, since it must function in proper position with the breech block. That there is any lee-

SHRINKAGE RECORD

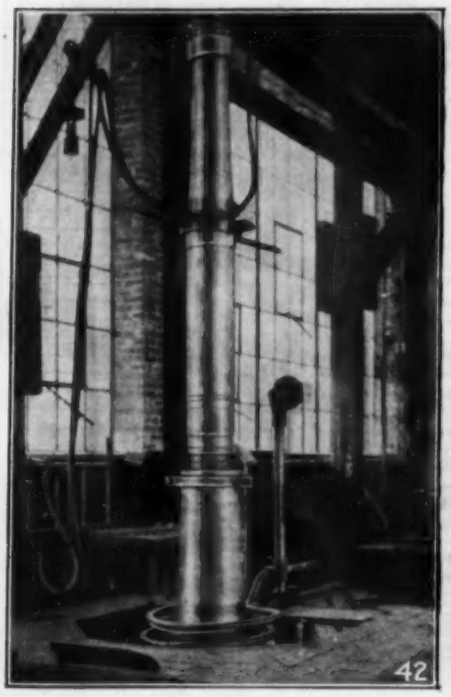
JACKET Forging No. B-268-F2-S TUBE Forging No. 25354-S

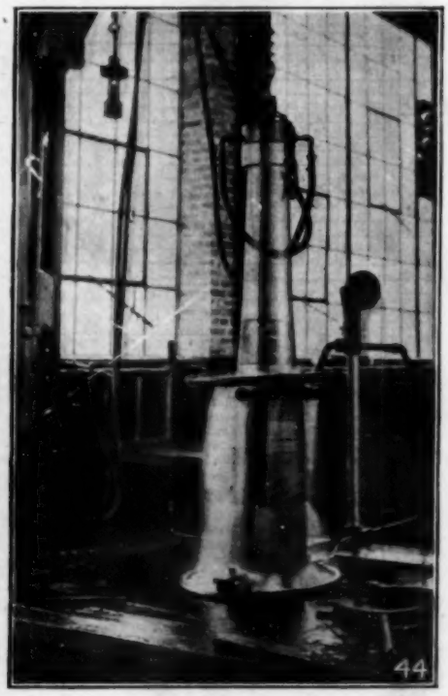
HOWITZER No. 536

	Hrs.	Min.	S.
Put in Furnace started cold	2	30	AM
Gauge 11.1571 Entered Muzzle	8	01	15
Removed from Furnace	8	02	—
Gauge 16.4447 Entered Breech	8	02	15
Clamped in Position	8	03	15
Tube Home in Jacket	8	04	—
Water On	8	04	05
Water Off	8	24	05
Total Time of Heating	5	32	—
Total Time of Cooling	-	20	—
Max. Expansion Breech	-	0516	—
Max Expansion Muzzle	-	0541	—
Color	-	Blue	—
Temperature	805°F		—
Condition, Joint Cold	O.K		

DATE ✓ Inspector.

FIG. 45. SHRINKAGE RECORD



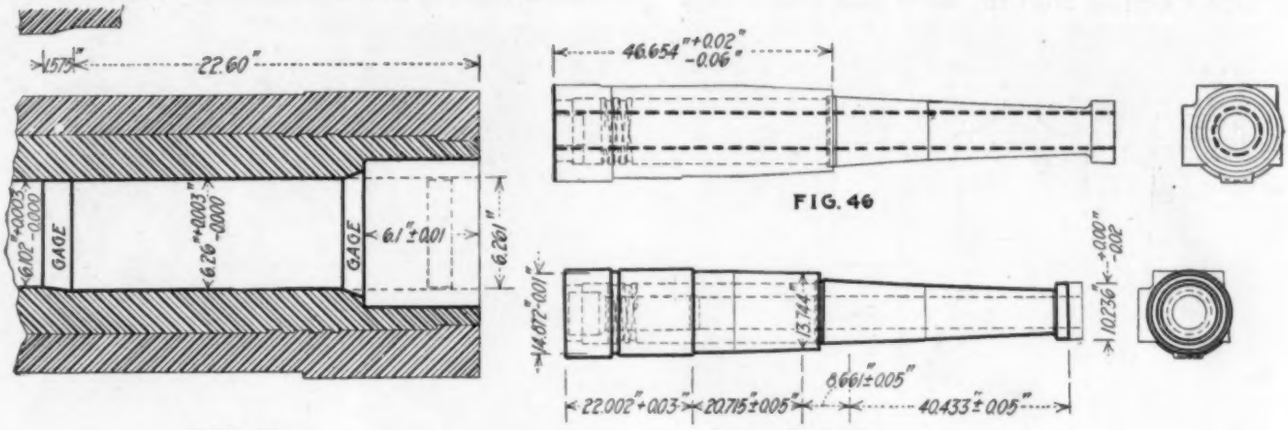


FIGS. 42 TO 44. SHRINKING OPERATIONS

Fig. 42—Tube in position for lowering into jacket. Fig. 43—Tube in jacket ready for shrinking. Fig. 44—Shrinking the jacket in the tube

way at all is due to the fact that the square end of the jacket is still very much over the finished size, and the later milling operations on this end are gaged from the exact position where the thread actually is started.

From this point on there is a series of operations conducted in shaping up the breech end of the body, the majority being of the nature of milling cuts. The layout of the work has been so arranged that these operations will practically take up the full capacity of the machines which have been provided. In nearly every case on the major milling operations only one operation is performed on each machine and the work is moved from one machine to another for the successive operations.



FIGS. 46 TO 48. TRANSFORMATIONS
Fig. 46—Finish-bore and face breech to length. Fig. 47—Bore powder chamber, gas-check seat and breech. Fig. 48—Finish-turn exterior

Operation 20.—Mill hinge exterior section, locating from thread-gage plug. Machines—Nos. 5431, 5432. Type—24 in. by 12 ft. Ingersoll milling machines. Tools—Special milling cutter, special setting-up gages. Coolant—1 to 12 solution Damascus cutting compound.

Operation 21.—Mill bottom section. Machine—No. 5470. Type—24 in. by 12 ft. Ingersoll milling machine. Tools—Special milling cutter, special setting-up gages. Coolant—1 to 12 solution Damascus cutting compound.

Operation 21A—Shape bottom section of breech exterior after milling. Transformation—Fig. 51. Machine—No. 5537. Type—Gould & Eberhardt shaping machine.

Operation 22.—Mill side opposite from hinge. Transformation—Fig. 52. Machine—No. 5430. Type—24 in. by 12 ft. Ingersoll milling machine. Tools—Special milling cutters. Coolant—1 to 12 solution Damascus cutting compound.

Operation 23.—Mill top section. Transformation—Fig. 53. Stamp serial number in counterweight slots, stamping to read as from breech. Machine—No. 5427. Type—24 in. by 8 ft. Ingersoll (open side) milling machine. Tools—Special milling cutters, gages. Coolant—Damascus cutting compound. Cut data—Variable.

Operation 24.—Turn body diameter in front of hinge lug. Machine—No. 5016. Type—36 in. by 18 ft. American lathe. Tools—Special jump attachment gages. Coolant—Damascus cutting compound. Cut data—Variable.

Operation 25.—Rough-mill hinge slot. Machine—No. 5428. Type—Ingersoll (open side) milling machine. Tools—Milling cutters, gages. Coolant—None.

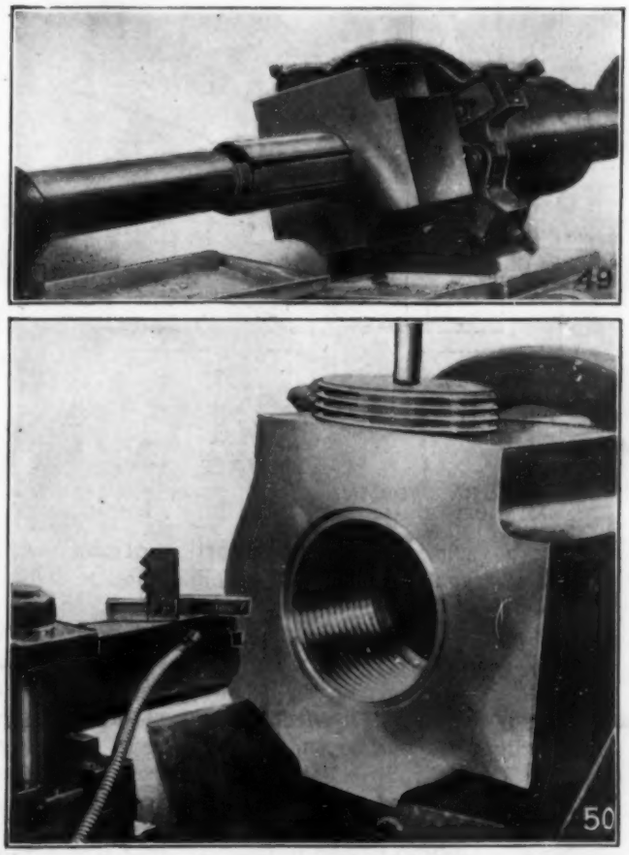
Operation 25A—Form-mill angle surface on hinge lug. Machine—No. 5429. Type—Ingersoll (open side) milling machine. Tools—Shell-milling cutters, gages. Coolant—None.

Operation 25B.—Form-mill angle cut on bottom. Machine—No. 5429. Type—Ingersoll (open side) milling machine. Tools—End-milling cutters, gages. Coolant—None.

Operation 26.—Counterbore collar clearance. Drill, bore and ream to a size the hinge hole, working from one side; bore clearance and counterbore top side. Transformation—Fig. 54. Machines—Nos. 5701, 5704. Type—No. 2 Rockford horizontal drilling machines. Tools—Bushing, Magic chuck with collets, cutter-setting gage, drills, boring-bar cutters, gages, two-steps reamer, plug gage.

As has been mentioned previously there is a certain amount of leeway allowed in starting the thread in the breech end of the howitzer, which is permissible because of the large amount of stock on the square end of the forging. Great care is necessary in setting up for the first milling cut on this end in order to have this surface come in correct position with respect to the thread. In Fig. 55 is shown the gage used for this purpose. It is screwed into the breech thread until it reaches a positive stop, and the swinging gage points *A*, *B* and *C* are used to locate the position for setting the milling cutter for the first part of the cut. Adjustment for height or for swinging gun bodies through a slight angular variation is made by jackscrews under the corners of the breech.

The setup showing the fixture for holding the body for milling and also the large milling cutter used for this cut are illustrated in Fig. 56. A solution of cut-



FIGS. 49 AND 50. BORING AND THREADING THE BREECH
Fig. 49—Boring head entering the breech. Fig. 50—Threading the breech

ting compound is flooded onto the milling cutters in a heavy stream and is kept from spattering by a large sheet-metal hood which surrounds the work and cutters while in operation. In this illustration the splash shields have been pushed to the rear of the machine out of the way. After the hinge section has been milled by locating from the screw plug gage as indicated for milling the remaining surfaces, all other points are located from it. Fig. 57 shows the method in which the gage for milling the bottom section is used for locating the cutters for this operation.

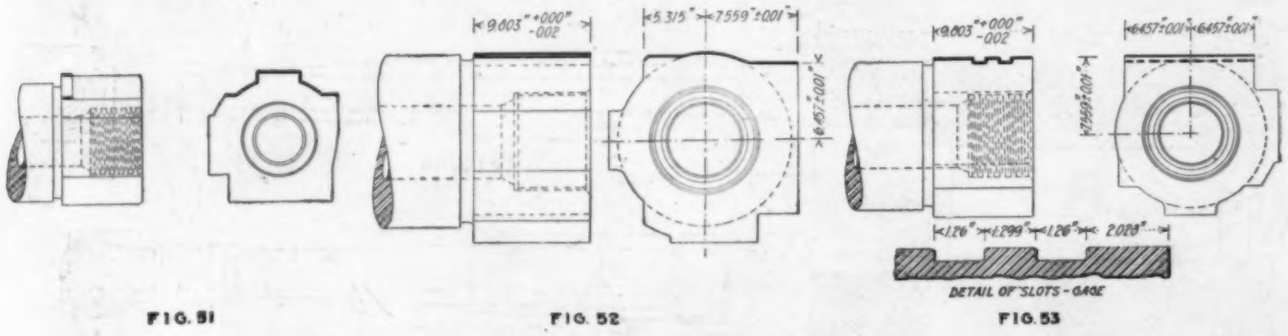


FIG. 51 FIG. 52 FIG. 53

FIGS. 51 TO 53. TRANSFORMATIONS

Fig. 51—Shape bottom section of breech exterior after milling. Fig. 52—Mill side opposite to hinge. Fig. 53—Mill top section

The milling cutter for the operation on the bottom section is not able to completely finish the cut without cutting a gash in the circular portion of the jacket. For this reason the operation is finished on a shaping machine.

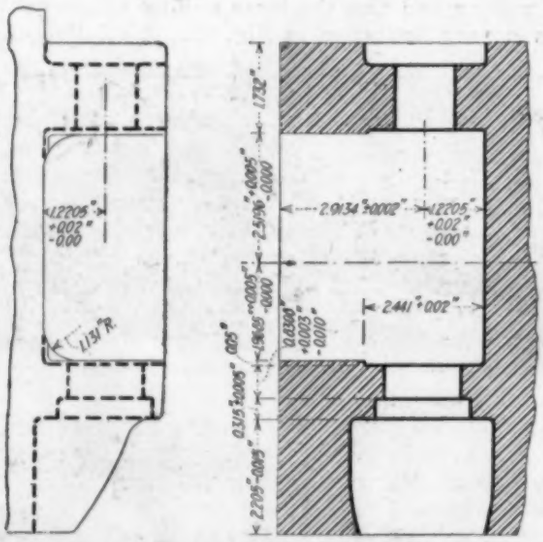


FIG. 54. TRANSFORMATION—COUNTER-BORE COLLAR CLEARANCE. DRILL-BORE AND REAM HINGE HOLE

The method of holding so large a piece on the shaping machine is illustrated in Fig. 58. It will be observed that the carriage is provided with an extension built of structural steel with a fixture at its outer end for holding the muzzle end. This fixture is in turn supported by a rolling bearing which runs on a steel rail and is provided with a jackscrew so that it may be raised or lowered. The spring of this extension is practically negligible, as it very readily feeds along with the movement of the table on the shaping machine.

The parts *A* and *B*, Fig. 59, must have the muzzle-end sides faced back to a considerable distance, while the block *C* must not be touched by the tool. This operation is taken care of by a fixture which gives the machine tool its name of "jump" lathe.

It will be noticed that the cam block *D* is attached to the outer circumference of the lathe faceplate. This cam block engages with a roller *E* on the swinging arm *F*. Pushing out this arm gives the shaft *G* a partial twist, which in turn, operating through the arms *H* and *I*, cause a withdrawal of the tool block so that the tool is not in a cutting position during the interval when the lug *C* is passing.

Rough-milling the hinge slot on the breech end is done on an open-side milling machine, Fig. 60. The roughing is done with a straight end mill and the finishing with the radius end mill shown in the illustration.

Operation 26 includes the counterboring of the collar clearance and the boring and reaming of the hinge hole, together with other operations as listed. The machine operations are performed by mounting the gun body on a horizontal drilling machine and clamping it in the fixture shown in Fig. 61. The drilling jig used as shown in this illustration is centered by a screw plug which fits in the breech thread. The drill bushing for the hole in one-half the hinge section is shown at *A*. After this hole has been drilled the pivoted supplementary jig *B* is rocked forward and held firmly in position by means of a bolt *C*, which passes through the square hole *D*. A hole is then drilled through the remaining half of the hinge section to carry the bushing *E* which guides a pilot on the outer end of the boring bar.

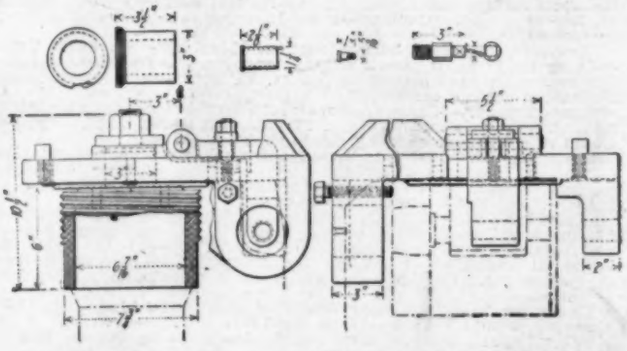
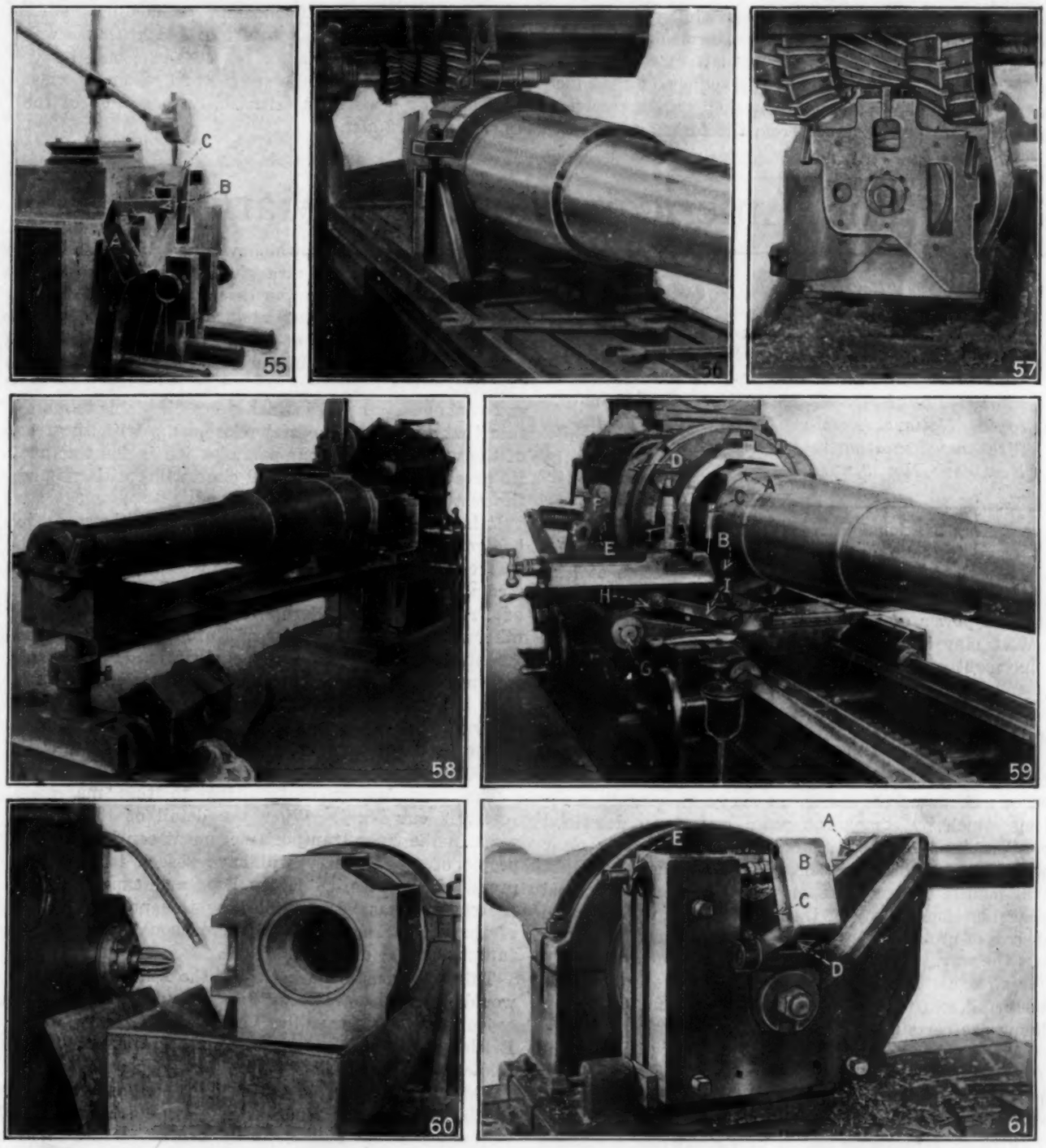


FIG. 62. JIG FOR DRILLING THE HINGE-PIN HOLE IN THE BODY

A series of boring bars is used to bring these holes

up to the correct size, and a special boring bar is used to make the final clearance cut on the inside of the hinge pocket.

The details of the thread plug which is used for centering the drill jig are shown in Fig. 62, which shows the drill jig in position on this centering device. A special operation on this work, designated 26B, calls for hand-reaming the final 0.20 in. of material from the dimensions of the hinge hole. A dummy carrier fixture and hand reamers are used for this purpose.



FIGS. 55 TO 61. GAGES. MILLING AND TURNING OPERATIONS

Fig. 55—Gages for locating hinge section. Fig. 56—Milling hinge section. Fig. 57—Gage for bottom section showing location of centers. Fig. 58—Shaping-machine extension. Fig. 59—Jump lathe. Fig. 60—Milling the hinge slot. Fig. 61—Drilling, reaming and counterboring the hinge-pin hole

A Foreman Who Was Not a Foreman

By M. E. Duggan

Some years ago I was employed in the pattern shop of a large manufacturing plant, where from seven to ten patternmakers were constantly at work on patterns for special machinery. There was no foundry connected with the shop, the patterns being sent to a jobbing foundry about two miles away.

The foreman of our shop called at the foundry every

day and studied every detail of the molding of his own patterns as well as those from other shops. This gave him a splendid opportunity to study the patternmaking and molding trades, and he was one of the best posted men along these lines that I have ever met, but he never passed on any of the knowledge he had acquired to the men under his charge.

During the 3½ years that I was employed in this shop not one of the journeyman patternmakers or apprentice boys (there were two of the latter) ever visited the foundry to my knowledge. Drawings of machine parts were handed to the patternmaker, but he received no instruction or assistance from the foreman nor was he permitted to seek the assistance of other workmen. He was free to make the pattern in the way he thought best; but if his way did not please the boss, what a "calling down" he would get.

This foreman took a special delight in criticizing in a most sarcastic way any faults he found with patterns made by his workmen. He was a poor man to teach the principles of the patternmaking or molding trades, but at faultfinding he was an artist, and his name was "Sandy." He has long since passed away, but the 3½ years that I worked for him seemed like yesterday when I read Sandy Copeland's criticism on page 766 of the *American Machinist.*

The American Merchant Marine

He who says "Foreign Trade" also says "Merchant Marine," for the one rests upon the other. The relationship between sea-borne commerce and a large and effective fleet of ships is explained in the following report, which was submitted by the Committee on Merchant Marine to the National Foreign Trade Council at its fifth annual meeting held at the Biltmore Hotel, New York, Nov. 8, 1918.

AS THE National Foreign Trade Council assembles in its fifth annual meeting the civilized world is alert with the hope that it has come at last almost to the threshold of reëstablished peace. The enemy's power of resistance is not yet wholly broken, and it may be that we shall be required to endure some months more of hard fighting and sacrifice before it collapses completely. But we are certain that it has been very greatly reduced and that it is destined in the not far distant future to full overthrow.

Concurrently with the restoration of peace there will confront the United States, as there will confront the other nations of the world, an array of weighty problems which by common impulse have been described as "problems of reconstruction." It is already clear what some of these problems will be. Others no doubt will manifest themselves only as conditions of actual peace develop. Many of them will be but variations in degree of problems with which we have labored throughout the war. It is clearly the part of wisdom and duty for all of us to make what preparation we can for the enduring solution of such of these problems as we now know are certain to confront us.

At the head of the list is the question of the merchant marine. Just as ships constituted the first problem of our participation in the war, so will ships constitute the first factor in our great task of reconstruction. It made no matter how many men we raised and equipped, or what supplies, what guns, what munitions, what airplanes and other paraphernalia of war we prepared. They were separated by nearly 3000 miles of ocean from the place where they could render effectively the service for which they were provided, and without ships to transport them they were all useless and a waste of effort. Thus ships have been the essential agency by which we have borne and are bearing our part in the struggle for civilization.

So also ships will be the essential agency through which we shall be enabled to do our full share in the work of reconstruction after the restoration of peace and in the development of our foreign commerce. And thereafter ships—our own American ships—will be the essential agency through which we shall be able to maintain that just and beneficial relationship with the rest of the world to which our participation in the war and its prosecution to a successful close will entitle us and the rest of the world.

It is not only with us but with several others of the belligerent nations that ships will render vital service in meeting the problems of reconstruction. Our immediate reconstruction work will be different from that of France, Belgium, Serbia, Italy, Roumania and the other war-ravaged countries of Europe. It will be different even from that of Great Britain. First of all we must repatriate the millions of our men who have been sent abroad to take part in the fighting. For many months now they have been going overseas at a rate of between 250,000 and 300,000 a month—nearly 10,000 a day.

The first agency contributing to this marvelous result is our Navy. When the detail of the Navy's work in the troop-transport movement can be told, the people of this country will have reason to be justly proud of the record. Every hope and expectation of the country has been fulfilled by this popular branch of the national service, and there should go to it the fullest measure of credit.

This enormous embarkation of the American soldiers would have been impossible without the maritime coöperation of our allies, especially Great Britain. British vessels have transported about one-half of our soldiers.

This service rendered to us and to civilization by the British merchant marine has entailed a substantial interference with Great Britain's oversea trade. When the war ends it will find hundreds of thousands, and perhaps even millions, of British soldiers on the continent of Europe. Great Britain too will have a problem of repatriation, necessitating the service of ships, but it will hardly be comparable in extent to our repatriation task.

The process of repatriation is not likely to begin

for some time after the cessation of hostilities. Definite establishment of the peace conditions may require some delay. When it does commence it is probable that because of the rapidly increasing construction of American vessels it will be possible to return more American soldiers per month under their own flag than were sent abroad in American vessels. And we should have the extensive aid of foreign vessels to minimize the time required for the return of our troops.

The troops of most of the belligerents, however, will be able to march or proceed by rail to their homes, and the redistribution of the men to their own places can be carried out much more rapidly, both by the Entente Allies and the Central Powers, than in our own case.

The Immediate Problem One of Reconstruction

In the United States, Great Britain and the Central Powers—where the war has not brought devastation and destruction to the industrial plants—the immediate problem will be the reconversion of these plants from production of war material to the manufacture of peaceful merchandise and the readjustment of labor so as to provide employment for the millions of men released from war service. In France, Belgium and the other war-ravaged territories there will be added the enormously difficult problem of physical rehabilitation—the clearing away of ruins, the erection of new buildings, the equipment of plants with new machinery, and all the vast labor of the restoration of industrial and agricultural activity and production.

Thus, as far as the demobilization and readjustment of labor is concerned, all the other belligerent nations are likely to be able to progress more rapidly than the United States, and to that extent to devote themselves more promptly to the urgent problem of renewing their efforts in foreign trade. Great Britain will be able promptly to release a certain portion of her merchant fleet from war service and to restore it to the commercial enterprises from which it has been diverted, although it will be necessary for her to accomplish fully the repatriation of her troops from her dominions and colonies. How soon and to what extent Germany will be able to resume oversea commercial operations under her own flag will depend largely upon the final conditions of peace.

Freed from the menace of the submarine and from the restrictions of blockades and war-zone regulations the Dutch, Scandinavian, Spanish and other neutral merchant fleets will be enabled at once to render the highest service to their nations in the rehabilitation and expansion of their oversea commerce.

The Most Effective Agency

Broadly and in rough outline that is the situation which will confront the United States upon the reëstablishment of peace. It is fortunate for us that one of our greatest contributions to war work will also render a most valuable service after peace has been restored. We are building the ships which will be the most effective agency in the permanent solution of these great after-war problems, always provided, however, that our nation adopts a definite maritime policy which will permit the permanent retention and operation of these vessels under the American flag. Just as the provision of ships has been and is absolutely first in importance in war-winning service, so is the adoption of the correct national maritime policy absolutely first in importance in the problems of peace already demanding solution at our hands. This matter should be taken up by Congress at once to enable our shipowners and others interested to make the necessary arrangements to take our proper place in the world's commerce.

A Large Element of Permanent Value

It is true that our vast enterprise of ship construction was undertaken essentially as a war measure, just as was the huge expansion of our production of guns and shells and all the wide range of other war materials. But in the ships we are building there is a large element of permanent value for peace as well as of war service. With the restoration of peace it is to be hoped that further need for guns and shells and other war supplies will be minimized, if not ended. But that fortunate date will mark the opening of a period of new and vital service to the nation for the ships we are now building as instruments of war.

The figures expressing the activities of the United States Shipping Board indicate the extent of the possibility of this new service. The National Foreign Trade Council has pointed out in previous reports dealing with this subject that it was the experience of Great Britain, the greatest maritime power of the world during the last 50 years, that less than 60 per cent. of British foreign trade is carried in British vessels. In ordinary times about 60 per cent. of the carrying power of British shipping in foreign trade is employed in bringing imports into and taking exports from the United Kingdom, the remaining 40 per cent. being engaged in trade between foreign ports. This shows the extent to which the shipping of a nation with a diversified foreign commerce must also be responsive to the demands of the commerce of the rest of the world. Great Britain's experience indicates that no nation with an extensive oversea trade will be able to transport all of its commerce in its own vessels, no matter how large and diversified may be its merchant fleet.

Some Shipping Figures

In 1915 1,871,543 tons of American shipping carried 14.3 per cent. of our total foreign commerce. In 1916 2,191,715 tons of American shipping carried 16.3 per cent. of our total foreign commerce. In 1917 18.5 per cent. of our total foreign commerce was carried in American vessels, but for war considerations, the official reports have not included the figures of the tonnage required for this transportation.

On the basis of an American merchant fleet of 10,000,000 gross tons estimated at a construction price of $75 a ton, a liberal estimate at prewar rates, such a merchant fleet would cost $750,000,000. But construction costs have risen enormously during the war. Much of the new merchant fleet is constructed at costs well over $175 a ton, although no exact official figures have been published by the Shipping Board. If, however, the average costs were $200 a ton the construction of a fleet of 10,000,000 tons would absorb only $2,000,000,000.

As a matter of fact Congress has appropriated

$2,896,701,000 for the various purposes of the Shipping Board, chiefly for construction, and has authorized the incurrence of contract obligations to the extent of $945,549,000 in addition. The work of the Shipping Board has thus been financed to the extent of $3,842,250,000, and there is pending a request from the board for further extensive appropriations. The board submitted estimates to Congress for the current fiscal year aggregating $3,054,350 000, but Congress reduced these estimates by nearly $1,300,000,000 in making the appropriation. The program of the Shipping Board includes not only construction of ships under direct contract, but the completion of requisitioned vessels, the repair of seized enemy ships, the financing of shipyards for the fabrication of steel ships, a very large expenditure for the provision of houses for the workmen at the shipyards and other large items not directly charged to construction. From all this it is apparent that with construction costs of over $200 a ton and with appropriations for construction greater than $2,000,000,000 the resulting fleet will be materially more than 10,000,000 gross tons.

A Recent Statement of the Shipping Board

In a recent statement covering its work the Shipping Board announced that its program included 2249 contract ships totaling 13,212,712 deadweight tons; 42 concrete ships totaling 301,600 deadweight tons, and 402 requisitioned ships totaling 2,790,792 deadweight tons, an aggregate of 2693 vessels of 16,305,004 deadweight tons. This provides a fleet of approximately 11,000,000 gross tons, and does not include 100 seized enemy vessels of an aggregate gross tonnage of more than 425,000 tons additional.

On Sept. 1 there were 2185 vessels within the jurisdiction of the United States Shipping Board, aggregating more than 6,000,000 gross tons. Of these, 449 were requisitioned American merchant ships, 100 were enemy vessels seized during the war, 256 were new vessels owned by the Shipping Board, 31 were old lake steamers transferred to the Shipping Board, 377 were American merchant ships not yet requisitioned, 81 were Dutch ships requisitioned by the United States Government, and 891 were foreign ships chartered either to the Shipping Board or to American citizens. It will be observed that only a comparatively small part of this tonnage was provided by the Shipping Board program. Nearly half of it consists of foreign ships requisitioned or chartered, which may or may not remain in American service after the war. But 1294 of these vessels of more than 4,000,000 gross tons in the aggregate fly the American flag, and it is evident that the completion of the present program of the Shipping Board will add approximately 10,000,000 gross tons to the American merchant fleet. We shall have therefore a fleet roughly estimated at 14,000,000 tons at least, ample, on the basis of the British precedent, to meet the needs of our foreign trade.

The Supply of Labor

There must be pointed out the probability, if not the practical certainty, that a considerable proportion of this tonnage will be unavailable for offshore service, especially under the conditions of competition which the new American fleet must meet. This refers particularly to the wooden ships which constitute so large a part of the Shipping Board construction program. It is well recognized that speed in construction has been a vital element in our provision of ships, and this has tended to increase the cost and, to a certain extent, to decrease efficiency. The expansion of shipyards, both in number and size, has been very great and very rapid. The supply of labor for these yards has unavoidably brought into service many thousands of men inexperienced in shipbuilding. Schools have been maintained for the instruction and training of workmen, and great effort has been made to increase the efficiency of the yards, but the best possible attainment has naturally been short of the standard of quality produced by experienced workmen in old-established yards and under favorable conditions.

Looking Forward to Certain Reduction

Every bit of service that such vessels can render now is highly helpful in the prosecution of the war, but the war itself operates to suspend conditions of competition which necessarily must be met by American merchant ships after the restoration of peace, and we must look forward to a certain reduction of the tonnage now included in the Shipping Board program when peace conditions again become operative.

In view of these facts your committee suggests the advisability of curtailing the program of wooden construction at the earliest date, and of preparing to transform into barges the surplus of the wooden steamers over those which can be employed economically. The machinery thus made available could be used with advantage in steel hulls.

In August, 1917, there were only 61 shipyards in the United States. Of these, 37, with 162 ways, were building steel vessels, and 24, with 73 ways, were engaged in wooden-ship construction. Today there are 203 shipyards in the United States, 77 steel, 117 wood, 2 composite and 7 concrete. Not all of them are yet completed, but 155 are finished, 35 more than half completed and only 13 less than half completed. There are 410 completed ways for steel ships, 400 completed ways for wooden, composite and concrete construction, and 63 steel and 54 wooden ways not yet completed. More than 385,000 employees are at work in these yards. The weekly payroll of the United States Shipping Board is more than $10,000,000. Two years ago there were fewer than 50,000 shipyard employees in the United States.

Expansion in the Construction of Vessels

This expansion is in the construction of vessels, but there has been a corresponding development of the production of engines, machinery and equipment of vessels. There has been the development of an entirely new industry in shipbuilding hitherto unknown in the world. It is the fabrication of steel vessels. The Shipping Board has promoted the erection of several vast yards for this method of ship construction, which alone are capable of producing more tonnage a year than could be turned out by the entire shipbuilding industry of the United States per annum prior to the war. It is inevitable that these organizations will constitute an important factor in American ship construction after the war and in the permanent retention

of an adequate merchant fleet under the American flag. The existence of a large body of labor trained in ship construction will constitute another important factor.

It is evident then that the restoration of peace will find the United States in possession of a merchant fleet much larger than that under the American flag at the outbreak of the war. This is true even if peace is restored in the very near future. The completion of the Shipping Board program, however, at least so far as the construction of steel vessels is concerned, will no doubt be effected even though peace is promptly reëstablished, and if the war should continue another year there may be even further expansion of this program.

While referring to the building program it is important to point out that the experience of the great maritime nations of the world has taught them that it is necessary to provide a certain proportion of passenger-carrying steamers in their fleets. These steamers range from the small cargo-passenger liners carrying a few passengers to the enormous high-speed Atlantic liners. It is most essential that our fleet comprise these various types of steamers in addition to cargo vessels.

All Types of Vessels Is Essential for Competition

A well-balanced fleet comprising all types of vessels, both passenger and freight, is essential if we are to compete successfully with the other maritime nations which already have all types of steamers. Nothing will foster in this country a maritime thought and spirit more than American passenger steamers ready to carry citizens to all parts of the world. The ships thus provided should equal or improve upon those of the present time if we are to take our rightful place as leaders in the merchant marine world.

It may be necessary to extend the program of steel construction in order to assist in making up for the depletion of world tonnage that has occurred during the war. Absolutely accurate reports of the extent of submarine destruction and normal marine losses are not now available. The Shipping Board has figured the total Allied and neutral losses for the period from August, 1914, to September, 1918, at more than 14,000,000 gross tons. It has estimated the total Allied and neutral construction during that period at approximately 10,000,000 gross tons. These figures indicate the present tonnage at something like 4,000,000 gross tons less than existed at the outbreak of the war.

The World's Need of Tonnage

But the world will need, at least for a considerable period after the reëstablishment of peace, the services of a tonnage even greater than that which existed prior to the war, and the merchant fleets now in being, even with the augmentation at present provided for by the construction programs of the United States and Great Britain, will be inadequate to the service they will be called upon to render.

It now seems probable that it will require the continuation of the present accelerated program of construction for a considerable time after the war in order to bring the world's ocean tonnage again to the point where it is adequate to meet the world's needs.

Thus the United States will emerge from the war with a large merchant fleet and with the facilities for its renewal and expansion, but unless positive steps are taken in the very near future toward the formulation and adoption of a sound national maritime policy it may be set down as entirely certain that these newly constructed American vessels will not remain in operation under the American flag and that the American merchant marine, rehabiliated with vast expenditure of capital and effort as a war-emergency measure, will again be dissipated under the operation of inexorable economic laws.

One thing is absolutely sure. Unless these vessels can be operated profitably under the American flag either they will be transferred to foreign registry or they will rust out a useless existence which will soon terminate on the scrap heap. Production is fundamentally a question of profit, and production of ocean transportation, especially in foreign trade, where we must meet the competition of the world's ships, is not different in its amenability to this economic law from the production of cotton or lumber or any other of the myriad articles of daily commerce.

A Law Enacted by Congress

It is true that Congress has enacted a law forbidding the alienation of any American vessel without the consent of the United States Shipping Board, but neither that law nor any other of similar character will keep any American vessel in operation or prevent barnacles from growing on its hull unless conditions are such that it can be operated under the American flag at a profit for those who are operating it.

The American national maritime policy, therefore, which is to provide for the permanent retention and operation of our new merchant fleet under the American flag, must be founded upon the principle that those operating the vessels shall be assured of conditions that will enable them to meet the competition of all other maritime nations on an equitable basis.

As your committee has pointed out in previous reports the law creating the Shipping Board recognizes the wisdom of operating the vessels of the new fleet through private enterprise. It provides that upon the termination of a fixed period after the reëstablishment of peace the board itself shall not undertake the operation of any vessels until after a bona-fide effort to sell, lease or charter such vessels has failed. It is obvious at once that any bona-fide effort to sell, lease or charter must take into account the exceptional element of war cost and war service. The chairman of the Shipping Board has publicly recognized this in an address in which he said:

Reduce the Valuation

"They [these ships] are being constructed because, and only because, of war needs, under conditions and pressure which have enormously increased their cost per ton over the cost of construction prevailing in normal times. It would seem fair that their valuation be written down to a point which will give them a fair chance to compete with vessels built before the war at much lower cost."

The merchant fleet provided by the program of the Shipping Board will represent at the conclusion of the war an expenditure by the United States of approxi-

mately $4,000,000.000. It is obvious that if private enterprise, in order to undertake the operation of these vessels under the American flag, is to be required to invest the full amount of that huge sum, it will not make the attempt. Manifestly the correct procedure is that indicated by the chairman of the Shipping Board in his suggestion that the valuation of the vessels be written down and that a portion of their cost be charged off to war service. This procedure would be eminently just, as well as absolutely necessary to the permanent retention and operation of these vessels under our flag. The war service rendered by these vessels is of the highest character, not second even to that of the guns and shells that they transport to the theater of war. But the guns and shells are wholly written off. Their entire cost is charged to war service. Whatever valuation may be determined upon ultimately as fair and just, these ships will represent a recovery of expenditure for the Government impossible in the case of vast disbursements for munitions.

Three Essential Factors

Broadly speaking there are three essential factors in the furnishment and operation of ships: the cost of capital, the cost of construction and the cost of operation. As far as the first is concerned the United States will certainly be in no worse position than foreign countries after the war. The probability is that we shall be in better position than some of the nations that will be interested in expanding their maritime enterprises. Private enterprise will be able to obtain at reasonable cost the capital necessary to extend its investment in merchant vessels. But private enterprise will not care to expand its investment in that direction unless there is reasonable assurance that it will be permitted to operate at a profit any vessels which it may purchase, lease or charter, and unless it has reasonable assurance that costs of construction will be such that renewals or additions to its fleet may be obtained upon terms which will permit competition with foreign fleets upon an equitable basis.

For reasons already referred to it seems likely that American shipyards after the war will be able to produce tonnage at the rates and under conditions that will compare favorably with those obtaining in foreign maritime countries. It is therefore in the third factor—costs of operation—that there are most likely to be found the disadvantages to American enterprise which will constitute the greatest obstacle to the continued successful operation of our new vessels under our own flag. These obstacles are found in certain provisions of our existing navigation system, the inevitable result of which is to increase the costs of operation to the disadvantage of American maritime enterprise.

Manning the Vessels

No one contends or believes that it is not desirable to have American vessels fully manned by competent crews, to have American seamen enjoy the best possible conditions of life and service and receive in wages due and ample return for their labor. But it is perfectly obvious that provisions of law which require American vessels to maintain larger crews and to pay them higher wages than is the case with foreign vessels necessarily subject such American vessels to a disadvantage which renders it difficult if not impossible for them to continue in operation against the competition of foreign vessels which can operate at lesser costs.

Your committee again draws attention to the vital necessity of an early and thoroughgoing revision of the American navigation system which shall strip it of its present inequalities and injustices if the merchant fleet now in process of creation as a war emergency is to be retained in operation under the American flag. Attention is again called to the fact that the law creating the United States Shipping Board directed the board to conduct an examination into comparative costs of construction at home and abroad; an examination into systems of classification at home and abroad; an examination into the question of marine insurance, and an examination of the American navigation system with a view to submitting recommendations to Congress covering its amendment, revision and improvement.

Suggestions Made by Various Committees

It has been suggested that the derangement of normal conditions resulting from the war has rendered difficult—even impossible—the practical performance of some of these tasks, such as the examination into comparative costs of construction and the examination into comparative costs of operation. Your committee suggests that a vast amount of valuable information is available as to conditions obtaining prior to the war and which may be approximated again not long after the restoration of peace. Your committee suggests also that no obstacles have been created by war conditions which render impractical the present performance of the investigations into the subject of marine insurance and the American navigation system ordered by Congress. Furthermore the information to be developed by these investigations is of the utmost importance in the formulation of the fundamental national maritime policy, which is an absolutely essential prerequisite to the permanent retention and operation of the new American merchant fleet under the American flag.

Recognition of Fundamental Principles

We cheer the acquisition of the new fleet and we applaud the energy of the Shipping Board and the tireless industry of the thousands of workmen in the mills and shipyards who have brought it into being; but our cheers will be idle and our enthusiasm and energy will have been wasted unless before the day arrives for the renewal of competition that is bound to follow the restoration of peace we have formulated and adopted a policy based upon honest recognition of fundamental economic principles, which will enable us to meet that competition with our new American ships, under the American flag, with honor and with profit to ourselves and without injustice or unfairness to our competitors. It is most important that the American should face his competitors under equal conditions. All that is needed is a fair field and no favor. As an incident of the international agreement and settlements soon to be worked out the maritime nations should agree upon uniform regulations which will impose equal conditions and requirements upon all alike. Such an arrangement would insure that equality which will give every one a fair chance.

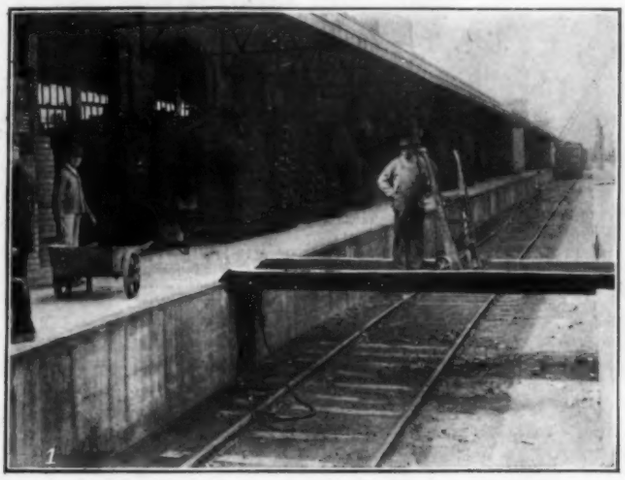
Manufacturing a Farm Tractor

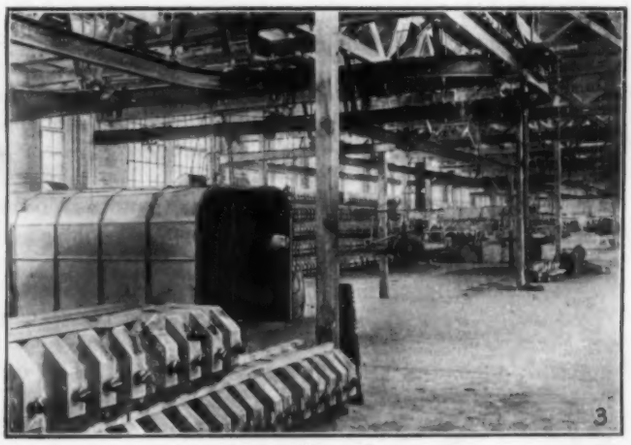
By M. E. Hoag

During the past few years the manufacture of farm tractors has become a very important industry, and while these machines can hardly be considered as machine tools their manufacture involves the use of much standard and special machinery that is of interest.

IT IS not my intention to describe machining operations in this article, but rather to deal with the general shop arrangement and methods of the Moline Plow Co.'s universal tractor plant at Moline, Ill. The buildings, with the exception of the drop-forge shop, are all single story, with concrete foundations, brick superstructures and saw-tooth roof. The concrete floors are overlaid with creosoted wooden block paving. These buildings have approximately 400,000 sq.ft. of floor space, which together with the tracks and yards within the factory inclosure aggregate several acres. The main building faces south and is 1100 ft. long by 100 ft. wide. It is used as a toolroom, a machine shop and as assembling, engine-testing, painting, finished-stock and inspection rooms. The walls of the building are well supplied with large windows above head level, which together with the overhead lighting gives ample light under ordinary conditions. For artificial lighting some Cooper-Hewitt mercury lamps are used, but nitrogen-tungsten lamps are depended upon almost exclusively, drop lamps being installed wherever their need is apparent.

To the north of the main building and running parallel with it is a railroad track sunk below the floor level so that cars can be loaded and unloaded with the least amount of labor. Between the main building and this track is a wide concrete platform under roof, affording ample room for the handling of material and for the storage of raw stock. Lift bridges at frequent intervals allow free movement of material from the drop-forge plant and foundry, which are situated to the north. A view of the main building, tracks, shed and bridges is shown in Fig. 1.





FIGS. 1 TO 3. VIEWS OF VARIOUS SECTIONS OF THE PLANT

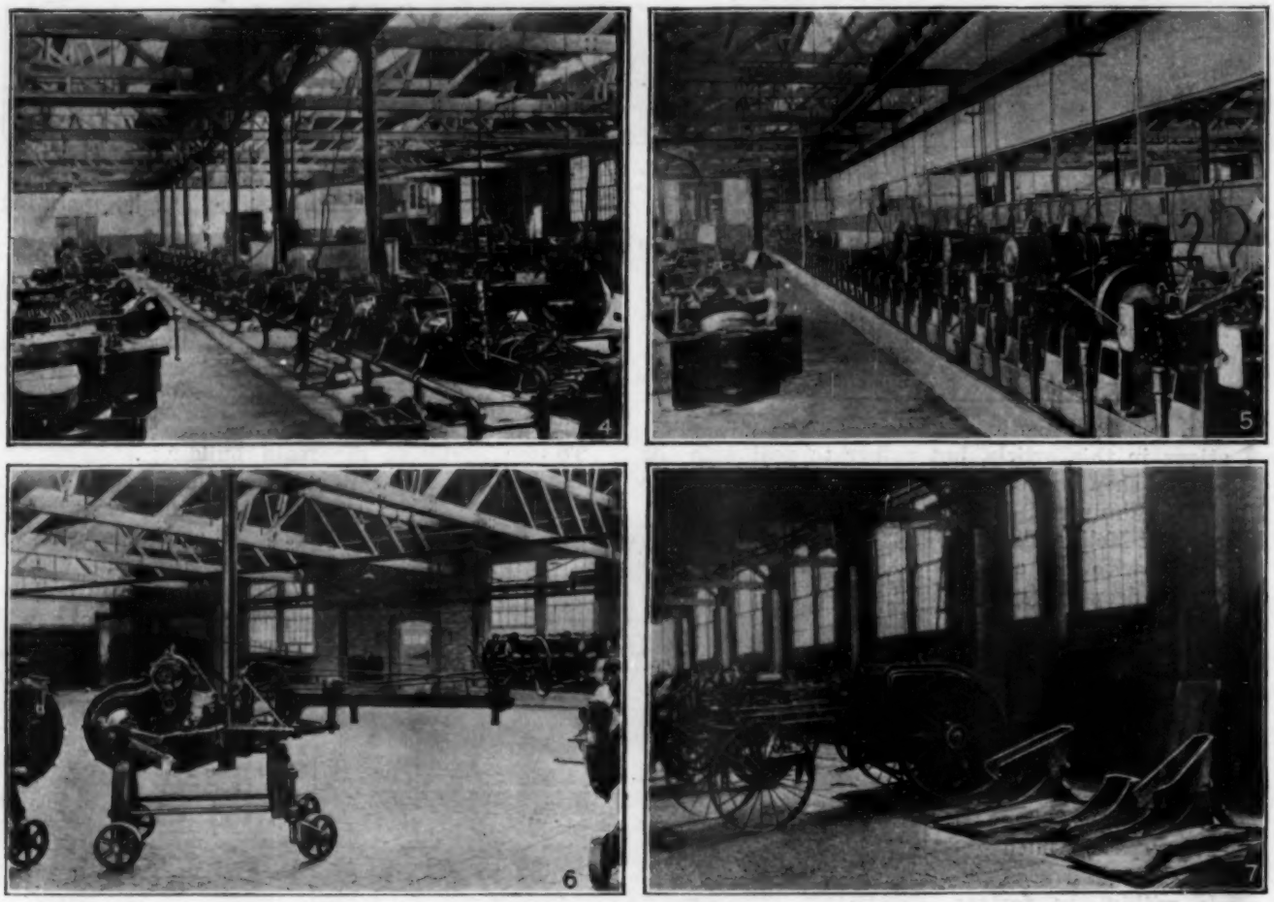
With the exception of the drop-forge plant, which has its own steam plant, all machinery is driven by electric motors arranged either for group or individual drive, power being supplied by the public-service company.

A building for testing and packing for export covers 75,000 sq.ft. of floor space, and the foundry, which has a daily capacity of 85 tons of gray-iron castings, occupies 65,000 sq.ft. and is equipped with overhead trolleys and air hoists for lifting heavy flasks, ladles and castings. Driveways are provided for horse carts for moving sand and castings. The cupola room and charging floor is 60 x 60 ft., and the snagging and sandblast room is 200 x 80 ft. The core room is 120 x 60 ft., and the coke bins cover 2750 sq.ft. A transformer room is 24 x 18 ft. Besides these buildings there are the pattern vaults and a large and finely equipped drop-forge plant and heat-treating department, which is equipped with baths and washrooms for the men. A room 100 x 40 ft. in the main building contains clothes lockers, enameled wash basins with hot and cold water and toilets.

A system of stock movement has been worked out in these snops whereby stock is kept moving forward at all times, and passes from the east end of the main building down the lines of machine tools to the final-inspection and finished-stock rooms, and thence to the assembling, testing, painting and shipping rooms, which are at the extreme west end of the building.

A good view of the screw-machine department is shown in Fig. 2 and gives an idea of the systematic arrangement of machines which prevails throughout the shops. Wide aisles running throughout the shops are bordered with strips of iron painted white, and no stock is allowed inside of these markers, which insures free passage for trucks at all times. The machine tools are set well back from the aisles, allowing ample room for operator and work, and are of the very latest and best makes to be procured.

Overhead trolleys and air hoists are provided throughout the shops, and a complete system of compressed-air pipes covers the machine shop and such other departments as require the use of air.



FIGS. 4 TO 7. ASSEMBLING AND TESTING THE TRACTOR
Fig. 4—Motor-assembling racks. Fig. 5—Motor-testing room. Fig. 6—Assembling trucks for tractor body. Fig. 7—Final testing blocks

A system of unit assembling is followed out, which greatly facilitates asesmbling the parts that go to make up the finished machine. After unit assembling, all parts that require painting are sent to the paint shop and either dipped or painted by hand or with the air brush as their shape or function may require. Where air brushes are used large steel hoods with exhaust fans and overhead trolleys, as shown in Fig. 3, are provided. The work is suspended from suitable hangers during the painting operations and until it is dry enough to be handled safely. Near the center of the illustration, Fig. 3, can be seen a motor on its hanger, and beyond this are rows of radiators and more engines still drying.

In the engine assembling room a system of progres-

sive assembling is carried out. The work starts at the near end of the rack shown in Fig. 4, and as each workman completes his task the cradle on which the engine rests is moved forward to the next workman on the left, so that when it reaches the extreme end of the rack it is ready for the testing room, a view of which is shown in Fig. 5. This room is of unusual construction and is very complete. Long concrete ways with cast-iron pedestals on them provide means for bolting down the motors while they are being tested, and at the same time make practically automatic connections with an underground system of piping for gasoline, water, oil and exhaust. Means are also provided for the recovery of lubricating oil used during the test.

Upon tracks which run behind the testing blocks are several electric motors equipped with pulleys and

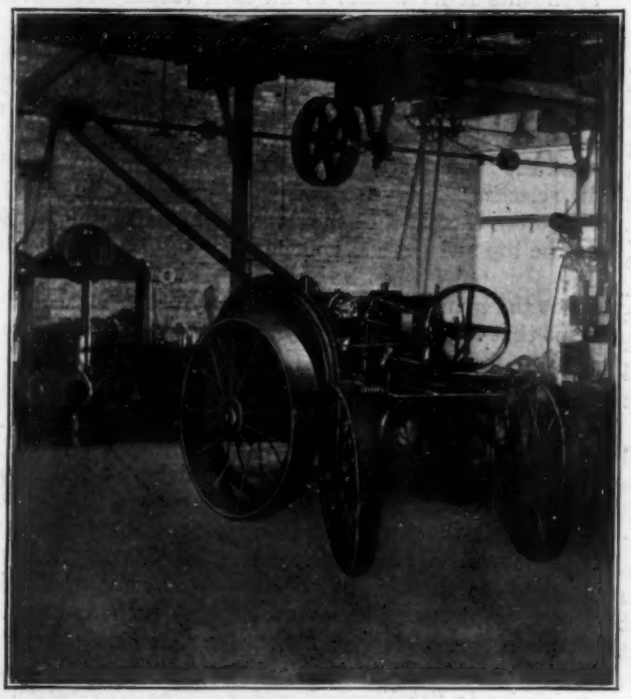


FIG. 8. TRACTOR DRIVING LINE SHAFT

belts for starting the engines and running them by power for a limited time before the final test, which is made by running the tractors under their own power for several hours. Overhead trolleys run in protected conduits back of the line of testing stands and supply power to the starting motors, which are moved along the tracks from one engine to another as required. In this manner a few motors are enabled to serve an entire testing section.

After the frame of the tractor is assembled it is placed on the wheeled trucks shown in Fig. 6 and is run into the painting hood where it is painted with the air brush, after which it is ready to receive the motor, wheels and other parts, which make it a complete tractor or, as someone has dubbed it, "The Benzine Mule." When all the parts have been finally assembled it is given a practical running test on the blocks shown in Fig. 7. The spikes on the treads of the driving wheels are not put on at this time, but the riveted heads of the spokes protrude, and as the wheels grind against the wooden blocks they produce sufficient shock and vibration to show up any loose connections or defective parts before the tractor is sent to the shipping room.

The Moline tractor can be attached to any farm implement or vehicle on which a horse can be used, and it can also be used in some places where a horse would not be handy, as can be seen from Fig. 8.

One day during a rush period in the tractor shops the transformers burned out. This, under ordinary circumstances, would have meant a shutdown of at least a day or two until repairs could be made, but someone thought of the tractors on the testing floors and a number of them were run into the shops, belted to the line shafts and in less than an hour the machinery was running as if nothing had happened.

Selecting the Employment Manager

BY MILES C. SMITH

On page 677 of the *American Machinist* Mr. Brasher sets forth under the title of "Selecting the Employment Manager" many points that should carry weight in many cases. The real stumbling block of many manufacturers has been their method of hiring their employees. They have paid out many dollars to efficiency experts and production wizards in a vain attempt to find the source of their trouble when all that they needed to do was to fire the employment manager who was flooding their shops with men irrespective of their qualifications.

Not long ago I discovered a most efficient man holding the position of foreman in a small concern, which by no means measured up to his abilities, and upon being asked why he did not seek a larger field where his services would be of greater value he replied that he had recently held a responsible position with a widely known firm, but it had insisted upon having a young squirt called the employment manager do all the hiring and it was impossible for him to get results with the class of help with which he was furnished.

I was much interested in what this man considered efficient help, so I took particular notice of the personnel of his department. There were over one hundred of the old-time mechanics, the kind of men that every employer will tell you that it is impossible to get at the present time, and I learned that most of them had followed this foreman to this shop and were willing to follow him elsewhere if the occasion arose.

Right here I wish to emphasize though that, from the foreman to the last man in the shop, I doubt very much if any of the average employment managers would have found room for one of them in his shop no matter how many vacancies he had. They were all men of the shop, without the higher education; they carried no credentials and they never worried about how much extra they were going to get for overtime.

It is of course desirable to know something of the history of an applicant, especially when the position applied for is more or less a responsible one, yet the right sort of employment man can tell more about an applicant in five minutes' conversation than miles of application-blank questions or letters of recommendation could.

In hiring men for my own departments, not as an employment man but as a superintendent, I have found that the average of mistakes in sizing up applicants for

vacancies has been less than one in one hundred, and I do not remember ever reading a letter of recommendation, although I have hired and tried out many department foremen as well as hundreds of skilled mechanics and laborers. Any man who cannot size up another in five or ten minutes' conversation certainly has no reason to call himself competent to be an employer of men.

What has become of the old-time master mechanic who would look you over once, ask one or two questions and put you to work, coming around a couple of days later and ask if you did not have a name? His shop was flowing over with efficiency although no one spoke of it by that name.

I do not wish to belittle the post of employment manager, for in these times and with the growth of industry it would be impossible to follow out the old ways. I do, however, second Mr. Brasher in saying that the best man obtainable is none too good for the post.

The Curse of Modern Manufacturing

Inefficient help is the curse of modern manufacturing. Too many times the department head feels that he either has not the right to complain to those above him about the class of labor he is getting, or that he would not be listened to if he did, and so he goes on from day to day under the worst difficulties imaginable in an effort to keep up his production, at the same time realizing that the proper kind of help could be obtained if the employment department was as capable as it should be.

In the article mentioned an interesting table is set forth giving a skeleton of the duties of an employment manager, and I will supplement it with a few general remarks concerning the error in the average methods of employment.

1. The applicant should be steady.—Naturally we all wish to keep our employees, for it costs many dollars to break in new men; consequently the applicant should show a record of years of uninterrupted employment; but there are limitations. If the applicant has been in one line for many years his knowledge is not apt to be general and he has probably acquired methods not compatible with our own and from which it is almost impossible to turn him. The floater will fit in anywhere and is more likely to possess the general knowledge which comes from working under all sorts of conditions, and if he receives the right sort of treatment, unless he possesses the characteristics which make a man always a floater, he may become a steady and valuable employee.

2. The applicant should be intelligent.—Employees with a dormant mind are more susceptible to accident and are less liable to become valuable workmen. There is little qualification to this except that lack of education is not always proof of a dormant mind, for many who are educated to some degree are far from active thinkers. Even the most ordinary kind of labor is performed better by the one who thinks for himself.

3. The applicant should be congenial.—One employee who is uncongenial to the other employees, the management or the work is capable of making no end of trouble. In this class we must place the agitator, no matter what his creed may be, and the class of employees who are readily susceptible to agitators. Sometimes too the employee who is working in a class which he considers below his station in life becomes dangerous unless he may see better times ahead.

All of these conditions the employment manager must be readily able to distinguish or the company may lose the service of valuable employees or it may find itself with a private revolution on its hands.

4. The applicant must be able to handle the job for which he is selected.—Under this head come his past experience, general knowledge and makeup. Here the employment manager has the opportunity to show his ability. He cannot assign applicants irrespective of their abilities and qualifications, nor can he judge everything from what an applicant writes on the employment blank. He must take the applicant's personality into consideration and also the personality of the foreman under whom the applicant must serve.

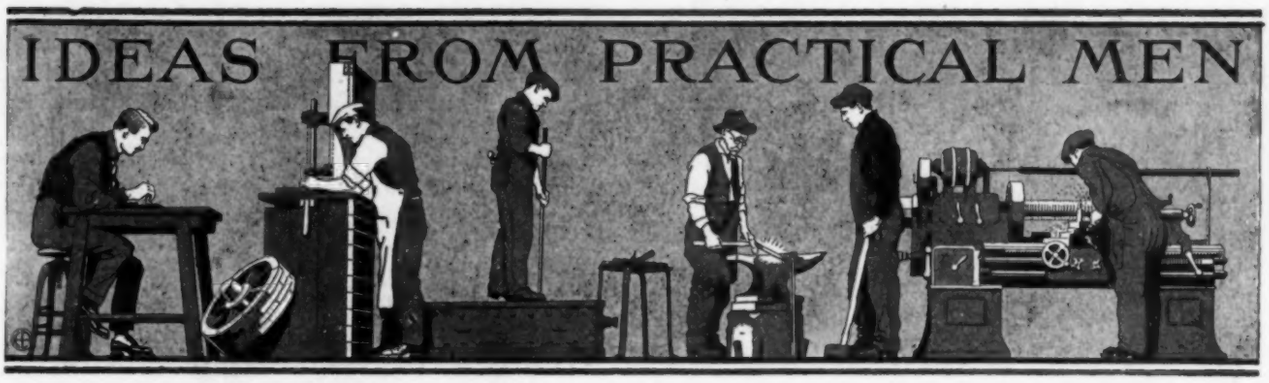
One man may be most efficient under one foreman and of no value under another, so it is up to the employment manager to know his foremen as well as his applicants if he wishes to fill each vacancy to increase efficiency instead of depreciating it.

I have often wondered on meeting executives, themselves showing the characteristics of leadership and executive ability, yet surrounded by a corps of inefficient and incapable assistants, whether or not they had used the same tactics their employment men were using in selecting their lieutenants. Perhaps they too had forgotten the old-time methods which had brought them to the top and were slipping into the new ways of judging a man by what he and his friends write and not what the man himself shows in his face and talk. Perhaps that is why the employment manager is what he is.

An Advertising Suggestion

By T. E. White

The other evening I happened to pick up a well-known theatrical journal and idly glancing over the part we might call the Spotlight Section (not to infringe the well-known Searchlight Section title) I was interested to note the shrinking modesty (?) of some of the jobless hamfatters. No modest caption such as situation wanted would ever satisfy the histrionic craving. Nothing so crude as that. When an actor gets out of a job he is "at liberty," and he likes to mention his many accomplishments, laying particular stress on the sartorial perfection of his attire, both while working and not. I thought it was up to me to call the attention of our craft to their deficiencies in the gentle art of advertising. Think how delighted some big manufacturer would be to glance over the situations-wanted division of the Searchlight Section and see staring him in the face, "At Liberty, Micrometer Mullins, the celebrated die maker and 'jo-block' juggler, one hundred days Pig Island Shipyard, six weeks Shootem's shell factory; doubles in jigs and fixtures; good dresser on and off. Photo on request." Or something like this: "Lawrence Logarithm, the famous Efficiency Expert and Business Buster, in his screaming farce entitled 'Putting the Bee in Business; assisted by his entire company of Pencil Pushers, Slide-Rule Shovers and Stop-Watch Holders, will be at liberty after Sept. 1. Present address care of the Receivers of the Down and Out Manufacturing Co." Using the foregoing samples as a guide might be a big help to some of the younger brethren when searching for an engagement. I think I'll try it myself the next time I'm "at liberty."



A Simple Form of Wiggler

BY L. S. WATSON

In an article on "Wigglers and Their Uses," page 559, of the *American Machinist*, I notice that in both examples shown the shell is threaded and a setscrew provided to adjust the tension on the ball.

I am using a wiggler that I find to be very satisfactory and that has the advantages of being simpler to make and of closing up like a jack-knife when not

A SIMPLE FORM OF WIGGLER

in use. The sketch will serve to show its construction very clearly.

It is made of ½-in. drill-rod with the shank end turned down to ⅜ in., the socket for the ball being formed out with a special boring tool which may be made in a few minutes' time. The hole in the body of the tool should be ¼ in. for a $\frac{5}{16}$ ball and should be drilled 1¼ in. deep to provide suitable spring tension. The body is then split in three places 120 deg. apart, like a spring collet.

A $\frac{5}{16}$-in. ball is annealed and drilled to receive the large end of an ordinary darning needle from which the eye has been cut off. The needle is driven or riveted into the ball and the whole is hardened.

A saw cut in line with one of the divisions is made through the length of the body, extending in depth to below the center so that the needle when in place may be turned back into the groove, thus protecting its point.

A thumb nick milled in one side of the longitudinal groove provides an easy means for opening the tool for use.

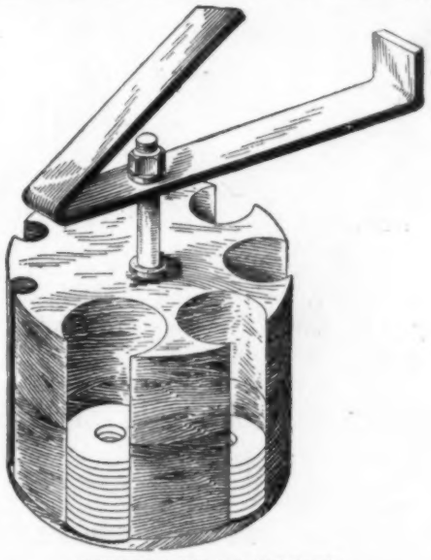
Before tempering, the jaws should be sprung in slightly to provide sufficient tension to hold the ball and needle in whatever position it may be set.

A Holder for Washers

BY CHARLES H. WILLEY

Here is a somewhat novel idea for a holder for different sizes of washers. It is very simple to construct, and being made from a couple or more pieces of 2-in. plank, a long bolt and a strap-iron bracket it is inexpensive.

Select a good piece of plank, cut off as many pieces as needed to make the desired depth, bolt or nail these together, as shown in Fig. 1, then scribe a circle for the washer holes. Bore each sized hole so that its outside edge comes on this circle. After the holes are bored, saw out so that the outside edge of each washer hole



HOLDER FOR WASHERS

is cut open, nail on a base board, make the wall bracket and put in the long center suspension bolt. Secure the holder at a height on the wall over the bench that will be handy to reach. This type of holder revolves, thus permitting all sizes of washers to be reached with ease.

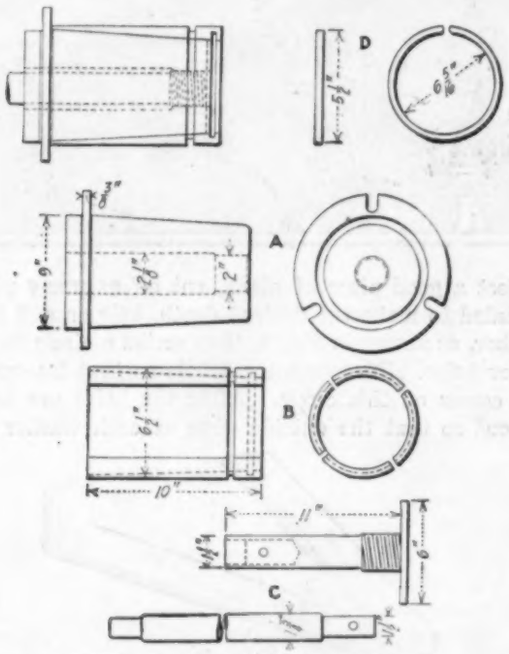
Improved Expanding Mandrel

BY F. PIERCE

Birmingham, England

The illustration shows an expanding mandrel that was found very useful on large chucking lathes for turning the outside diameters of work having blind holes. Briefly it consists of the hardened-steel centerpiece *A* machined all over and locating itself true by means of the spigot ground to fit a recess in the faceplate or chuck. The taper sleeve *B*, contrary to the usual practice, is split through its whole length into four pieces, being held together when in position by the spring ring *D*. A groove is also turned as shown on the outside of *B* to fit the flange on the drawbar *C*. This insures a positive withdrawal of the sleeve *B* from the centerpiece *A* when the drawbar is pushed forward by rotating the handwheel at the rear of the machine.

At the same time the spring ring *D* is tending to collapse the sleeve *B* and thus facilitate the removal of the job from the mandrel. The drawbar *C* was made in two pieces for economy in production. Though the particular job on which these mandrels were used was one demanding heavy services from the machines it should be added that they gave an exceedingly strong grip and were quite satisfactory in use.



DETAILS OF EXPANDING MANDREL

A Short-Blade Reamer for Use in Cramped Places

By Robert Belmont

The tool shown in Fig. 1 was designed for use in jigs and cramped places where there is not sufficient room to allow the regular form of reamer to be used.

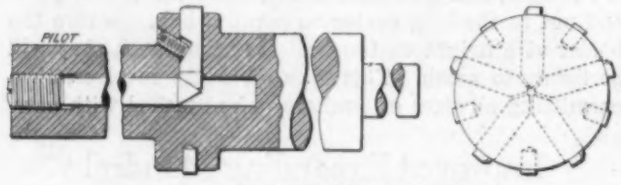


FIG. 1. A UNIQUE REAMING TOOL

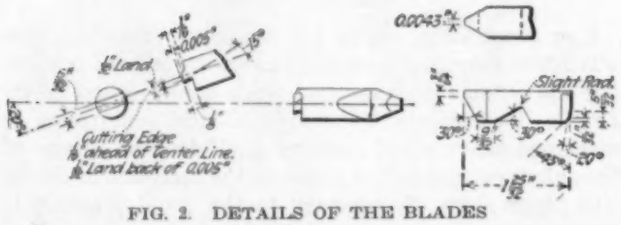


FIG. 2. DETAILS OF THE BLADES

On putting the tool into service it was found to produce excellent results, the holes reamed by it presenting the appearance of ground surfaces.

We are now using this style of tool on many jobs, both in drilling and screw machines, and we attribute the smoothness with which it works to the shape and position of the cutter blades, which are shown in detail in Fig. 2.

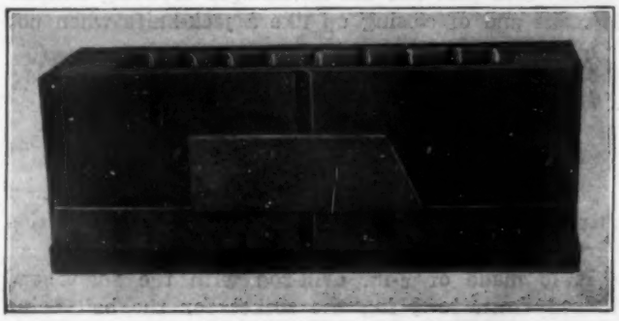
To facilitate measurements in grinding the tool to size hardened-steel plugs are set into the body exactly opposite each blade and ground to a predetermined diameter without the blades in place. Thus to grind a reamer to cut 3.750 it is only necessary to make the measurement over each blade and its corresponding plug 3.625.

The blades are easily adjustable for size as will be seen from the drawing.

A Magnetic Work Holder for the Disk Grinding Machine

By Robert Mawson

The illustration shows a handy device which was made for the purpose of holding cutter blades and similar work for grinding upon the disk grinding machine. The device consists of a permanent magnet sufficiently magnetized to hold the work, a narrow ledge together with pins set in the face of the magnet serving to hold the work against the thrust of the wheel. The magnet is mounted on a fiber base which provides insulation between it and the table of the machine and prevents the "short-circuiting" of the magnetic current.

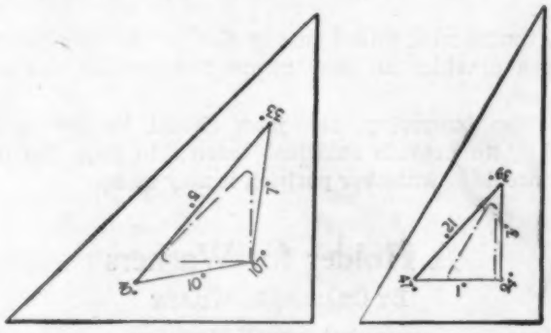


MAGNETIC CHUCK FOR THE DISK GRINDING MACHINE

Extra Angles on the Triangle

By Edward Heller

By cutting out the inside of my triangle as shown in the sketch I have many more constant angles available without using the protractor. Notice that the angles are such as are largely used on cutting tools for lathes, screw machines, etc. The dotted lines show the original shapes of the triangles.



THE IMPROVED TRIANGLE

Have you answered the Red Cross Christmas Roll Call ?

Once More Boys—

Let's show 'em what
American Machine Shops can do.

All together now!!

Have you a little Peace Table in your shop?

This is a timely question just now when there is so much being said about the big Peace Table in France.

Some people seem to think that the deliberations and conclusions at the Paris conference are going to settle the world's future socially and industrially as well as politically.

As a matter of fact, don't *you* think that this conference will be doing very well indeed if it succeeds in drawing us a new map of the Eastern Hemisphere for our geographies and in settling such little questions as indemnities and the freedom of the seas? *We* do.

Because, after all, this big Peace Conference will be only a super-legislative body, and there are things that even lawmakers cannot do.

Even a unanimous vote cannot compel turnips to grow on apple trees or repeal the law of gravity.

All of the builders and users of machinery might meet in convention and agree that thereafter a six-pitch pinion should mesh with an eight-pitch gear—but the laws of Nature would simply laugh at the mandate.

Foolish, isn't it? Not a bit more so than to attempt to sidetrack the law of Supply and Demand or to dodge the ancient edict that reads, "By the sweat of your brow shall ye earn your bread"—the said perspiration being interpretable as either internal or external.

That is why we asked if you had a little Peace Table in your shop.

We believe that these individual shop Peace Tables can bring about industrial harmony a thousand times more easily than can the deliberations of national or international bodies.

* * *

Fifty years ago when all shops were small, Capital called Labor "Jack" and Labor called Capital "Jim," and everybody was happy.

Jack very likely worked on the product from start to finish; saw each part grow from rough casting or forging to finished piece, and after the whole was assembled hung over the completed machine on the test block with the eagerness of a mother watching a new baby.

When Jim went out to collect a tough account Jack wished him luck and was glad that his job was to run a lathe instead of having to meet a payroll by drawing blood from turnips.

Jack knew just as well as Jim that the more apples you put in the pan the thicker the pie, and as a result he put in his best licks so that there would be enough pie to pass around on pay day.

Then industry began to grow and grow and shops got bigger and bigger until finally Jack became Operative No. 1102, and too often wouldn't have known the man he was working for if he had met him on the street.

Operative No. 1102 performed one operation on one part of a product that went into some part of a machine that he never saw and took no interest in. Just where his wages really came from he didn't know or particularly care as long as the envelope containing them was shoved regularly over the sill of the cashier's window.

Then one day along came a persuasive and eloquent individual who told No. 1102 that his employer was treating him unjustly. Not having any information to the contrary he accepted this statement, although, between you and me, he had not been getting unjust treatment so much as he had unintelligent treatment.

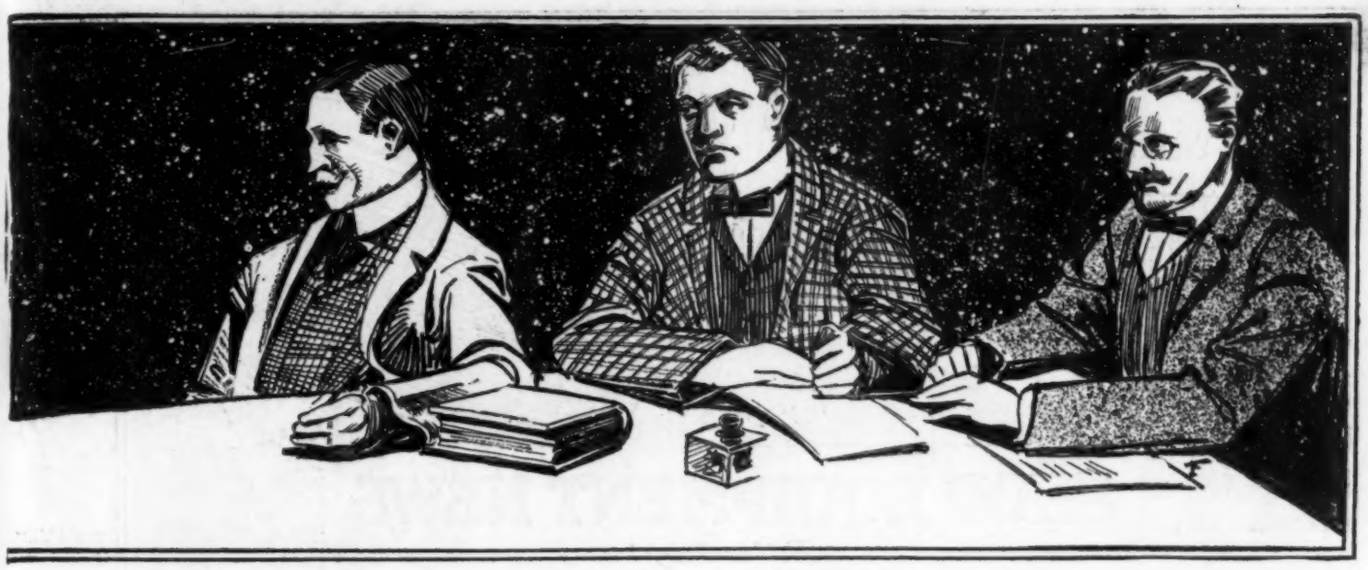
And so the breach widened.

* * *

Man alive, in the old days if someone had told Jack that Jim wasn't treating him squarely he'd have punched the fellow on the nose.

* * *

Of course we can't go back to small shops again. Industry has laid aside its knickerbockers and put on long trousers for keeps.



We can't do away with specialized operations and quantity production and go back to one machine at a time.

If we did either of these things the cost of our products would be so high that nobody could buy them, or the wages that we could pay would be so low that nobody could live on them.

But we can bridge the gap with the individual shop Peace Table.

* * *

If you had been brought up in a family that voted the solid Democratic ticket; if all of your friends were Democrats; if all of the newspapers that you read were Democratic papers and all of the political arguments that you heard were on the free-trade side of the fence, it is a one-hundred-to-one shot that you would become and stay a Democrat. There is no politics in this remark, for the same thing is equally true if your environment had been Republican, except that you would in all probability become a Republican instead of a Democrat.

There is no politics in this, but there is a point in it. The point is that you can't expect a man to see things as you see them unless you show them to him as you see them.

You can't expect a man to take an interest in your business unless he knows what your business is. A machine can be made to work efficiently without knowing what it is doing, or why, but a man can't.

How much real effort have you made to get your men to understand such things as interest on plant investment, maintenance charges, indirect labor, selling expense, credits and collections?

Who is to blame then if most of them, thinking that direct labor and material costs are all that is involved, believe that you are making from 100 to 150 per cent. profit?

How much real effort have you put into spreading the gospel of the labor-saving machine? You go to considerable pains to let your customers know what labor-saving machines will do to their costs—but have you been equally diligent in letting your workers know what labor-saving machinery and efficiency will do toward maintaining high wages or raising low ones?

You know of course that the salvation of American Industry in the future demands our concerted effort for foreign trade, and the repeal of such laws as the Sherman Law. But do your men know that the salvation of American Wages depends on the same thing? Who do you expect to convince them of this fact if you don't?

Labor and Capital are the two legs of American Industry, and a shackle on either leg will hold the other back. Hammer out these facts at the shop Peace Table and you will find Labor eager to help with the hacksaw.

The only Capital and Labor problem is that created by mutual ignorance aided and abetted by shyster lawyers, peanut politicians and long-haired theorists who make a living by urging people to trade the birthright of experience for the pottage of vague possibilities.

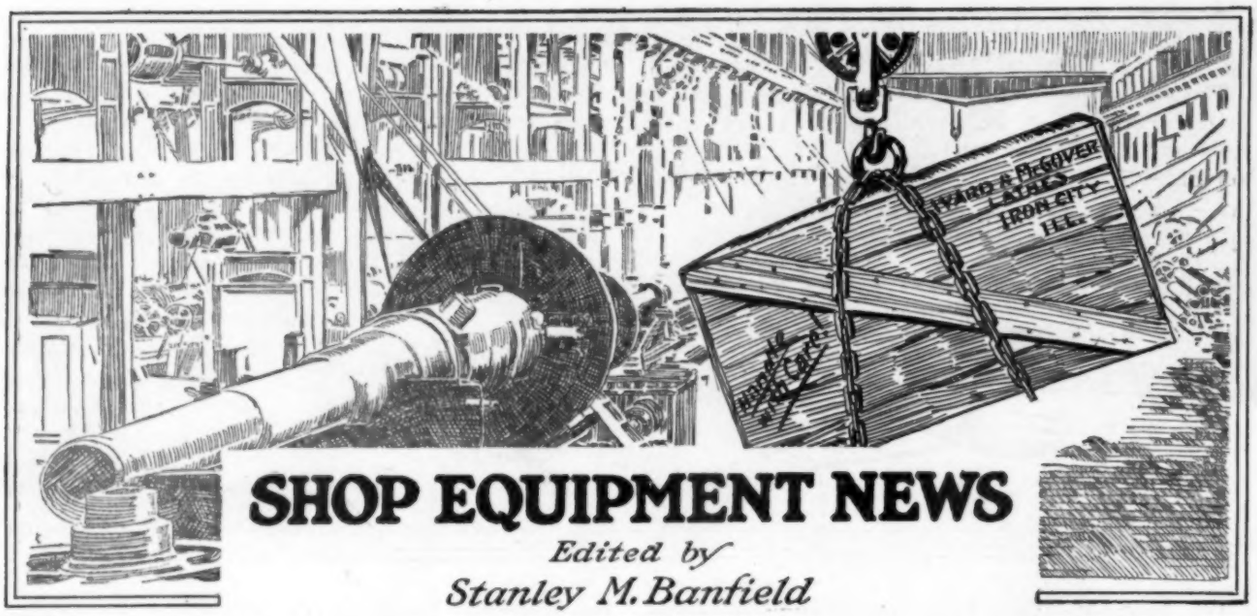
The individual shop Peace Table is the antidote.

Gather your men around it, Mr. Manufacturer, and they will help you brand the shyster lawyers, the peanut politicians and the I Won't Workers "Non-essential" and kick them downstairs.

And when the shackles of ignorance and petty politics are cut from the legs of American Industry it will go ahead at surprising speed, taking both legs with it.

John H Van Deventer

My God!



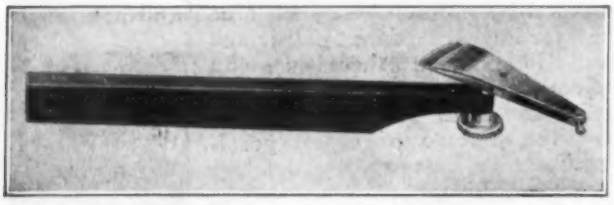
SHOP EQUIPMENT NEWS

Edited by
Stanley M. Banfield

In conformity with a Post Office ruling, descriptions of new equipment can only be used in this department which have not been previously or simultaneously advertised in this or any other periodical.

Ideal Test Indicator

The universal test indicator illustrated is manufactured by the Ideal Tool Co. and sold by Johnson & Miller, 42 Murray St., New York City. The device is substantially made, with a body of drawn stock and working parts of hardened tool steel moving in bronze bushings. The contact point is spherical in shape,

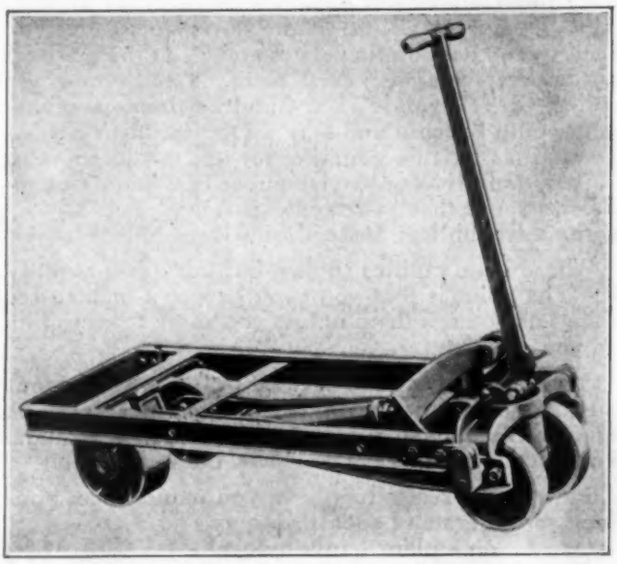


IDEAL TEST INDICATOR

having no square edges to catch when running along the work, and can be turned to 90 deg. on either side of the indicator by simply pushing it into the desired position. A friction device is incorporated to protect the point from accident in case the work being tested is jammed or pressed too hard against the contact point. The device indicates on either side of the zero point, the scale being graduated in thousandths, the divisions being $\frac{1}{10}$ in. apart, making reading easy. The weight of the complete device is $\frac{3}{4}$ ounce.

Barrett Lift Trucks

The Barrett-Cravens Co., Transportation Building, Chicago, Ill., has recently placed two new types of lift trucks on the market known as types H and Y. Both trucks are made in eight styles and are for loads of 5000 lb., model H having a width of 20 in., and model Y a width of 27 in. They are built in lengths of 42, 48 and 60 in., and their heights when lowered are 7, 9 or 10 in., or higher on special order. The trucks are claimed to be practical and simple in construction. In lifting, the handle connects directly into the upper frame, there being no connecting links to break or get out of order. The handle is automatically disengaged from the upper frame when the load is raised and remains either upright or drops to 15 in from the floor. It is said of the construction of the automatic safety

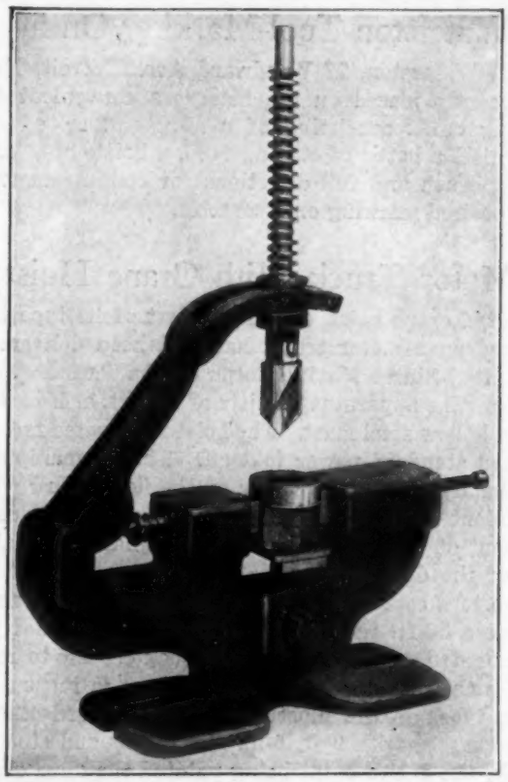


BARRETT MODEL H LIFT TRUCK

lock that the heavier the load the stronger it will grip and the more it wears the more secure it becomes. Four wheels are used, these being made with a chilled tread, which is 2 in. wide on the front wheels and 4 in. wide on the rear wheels. Hyatt roller bearings are used, and the axles are of $1\frac{1}{4}$-in. alloy nickel steel. The turntable is $\frac{1}{8}$ in. above the axle and has a diameter of 5 in. The platform stop used is wide in order to avoid damaging platforms or racks.

Skelton Burring, Countersinking and Chamfering Fixture

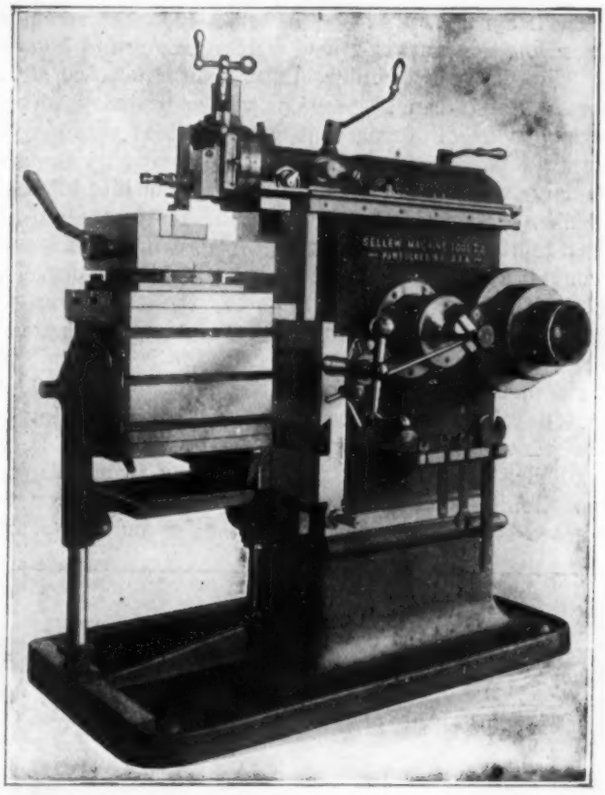
The automatic fixture for burring, countersinking or chamfering light work after it leaves the automatic screw machine, one of the recent products of the Skelton Sales Co., Syracuse, N. Y., is shown in the illustration. The device is intended to be attached to any small drilling machine. The tool-carrying fork and the cam for closing the jaws on the work are integral, the amount of tension on the work being governed by the strength of the spring operating on the fork. Adjustments for different sizes of work may be quickly and easily made, and after this is once done parts may be handled rapidly. The machine is at present made in two sizes, No. 1 having a jaw capacity for parts up to ¾ in. in diameter, the length of the pieces handled being from $\frac{1}{16}$ to 1½ in., and No. 2 a jaw capacity up to 2 in. in diameter, taking pieces from $\frac{1}{16}$ to 2 in. long.



SKELTON AUTOMATIC FIXTURE FOR BURRING, COUNTERSINKING AND CHAMFERING SMALL SCREW-MACHINE PARTS

Sellew 16-In. Crank Shaping Machine

The Sellew Machine Tool Co., Pawtucket, R. I., has placed on the market the 16-in. belt-driven, crank shaping machine shown in the illustration. While primarily intended for toolroom work it has been made heavy and rigid enough for general manufacturing work. The machine is said to be particularly convenient of adjustment and operation through the design which permits the operator to make all adjustments, settings and speed changes from one point on the operating side of the machine. The motion of the ram is obtained by the use of a crank motion, and bevel work is facilitated by several universal angular adjustments having degree and micrometer readings for both the tool and the work for obtaining compound angles. The maximum size of work handled has been increased by extending the height of the machine, thus permitting more room for the work and a maximum vise range. Other adjustments have also been increased to a maximum. The table is so arranged that it may be swiveled around an axis parallel to the line of tool travel, this adjustment being accomplished through worm gearing and a hand crank, which serves to lock the table at any point throughout its range of 130 deg. of adjustment. The angle of the table at any point is indicated by a graduated dial plate at the front. The table is clamped by a binder bolt in the center of the graduated plate. The top and side of the table are equipped with three T-slots. The tilting table for taper work can be used on the side or on top of the table, the elevating adjustment being so designed that it can be used when the table is swiveled around to any angular position for planing compound angles. The outer end of the table is supported by an adjustable rest or support that rests directly on the base of the machine. The tool slide is provided with an automatic feed and also an automatic knock-off and stop, this being operative for any position of the head. The ram has square lock ways, and gib screws are fitted with lock nuts. The ram mechanism consists of a sliding block and slotted lever, and the motion obtained gives a quick return stroke of about double the speed of the forward, or cutting, stroke. The location of the stroke in relation to the work is adjusted by the crank and clamp lever at the top of the



SELLEW 16-IN. CRANK SHAPING MACHINE

Length of stroke, 16 in.; automatic cross-traverse, 21 in.; vertical adjustment of table, 12 in.; top of table, 13⅛ in. long, 12⅜ in. wide; side of table, 13⅛ in. long, 12⅜ in. wide; vertical or angular movement of tool slide, 3⅛ in.; greatest distance from bottom of ram slide to top of table, 15 in.; capacity of swivel vise, 8 in.; vise jaws, 10 x 1¾ in.; width of belt, 3 in.; weight with countershaft, 2300 lb.

ram and can be changed while the machine is in motion. Box construction is used for the cross-slide, which is of gapped construction, providing chip clearance in the center. The elevating mechanism is equipped with ball thrust bearings. The vise has been designed for large capacity and has a solid front, the movable jaw being of the swivel type so that angular or irregular shaped work can be held. The base is clamped to the table by four bolts. The base of the machine has a raised rib around its edge, thus acting as a pan. Tool shelves are provided on the outside and inside of the door and also beneath the table. The countershaft has two sets of tight and loose pulleys running in the same direction, which with the three-step cones give six speed changes.

Haynes "Tip-It" Welding Compound for Stellite

The Haynes Stellite Co., Kokomo, Ind., has recently placed on the market a new welding compound known as "Tip-It" for use in welding Stellite to other steel parts. Welds can be made with the ordinary forge, coke, gas or oil furnace as long as it is possible to obtain a heat of 2000 deg. F. The compound is particularly adapted for welding Stellite tool bits to steel shanks, and in this work the shank is recessed to fit the Stellite bit, and the two are placed in the fire and brought up to a temperature of about 1600 deg. F., at which time they are removed, the scale scraped from the shank and a thin layer of compound spread along the recess for the bit. The bit is then put in place and the heat is brought up to about 1800 to 1850 deg. F., when the compound will begin working in the joint. When a heat of 1900 to 1950 deg. F. is reached a fine bluish flame will appear from between the Stellite and the steel. When this condition is reached the tool is removed from the fire and a pressure brought to bear along the length of the bit, this pressure being of about 50 lb. per square inch. After this pressure is applied the weld is complete and the tool can be handled as one piece. It is stated that this method of welding does not require an expert, as the compound acts as its own thermometer and gives notice when the proper temperature has been reached.

Waterston Tool-Marking Outfit

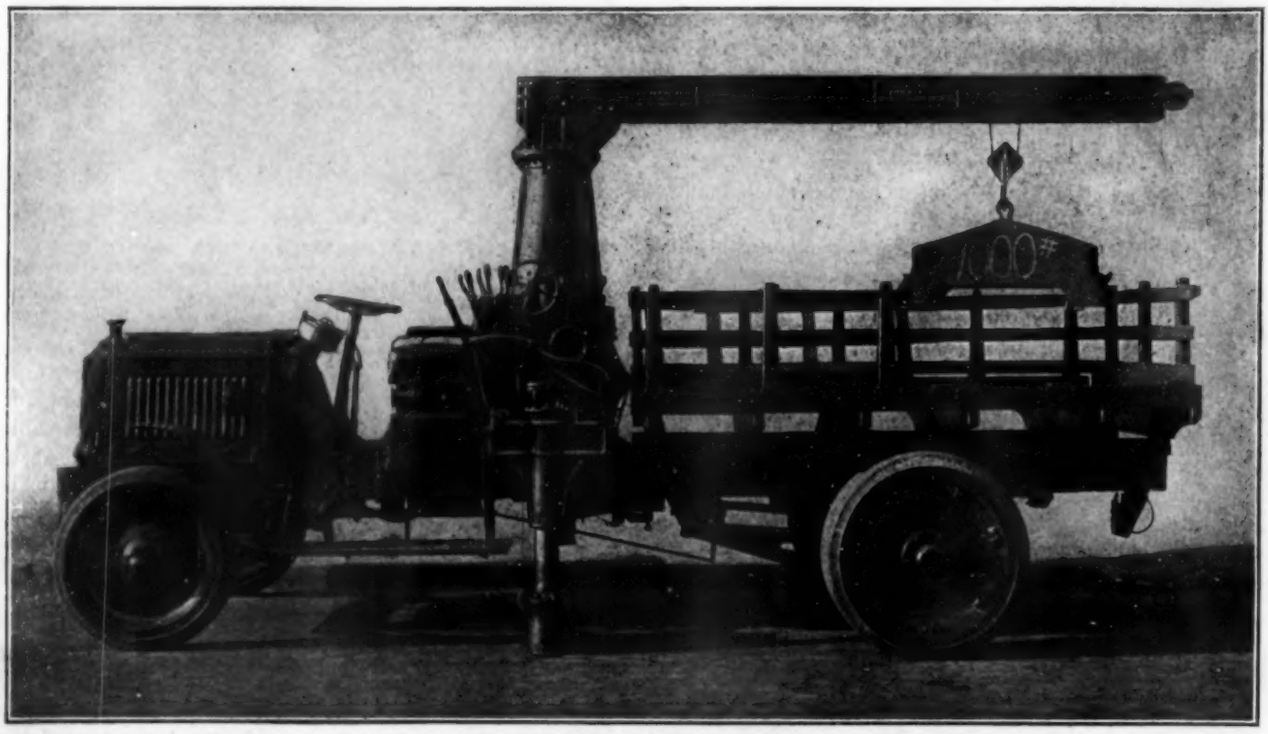
J. M. Waterston, 77 Woodward Ave., Detroit, Mich., has recently placed on the market a convenient tool-marking outfit consisting of a steel scriber, a bottle of varnish, a bottle of etching fluid, a bottle of cleaning fluid, a brush and full directions for etching names or other desired marking on steel tools.

Motor Truck With Crane Hoist

A novel crane hoist, one of the first of its type to be mounted on a motor truck, has just been delivered to the United States Marine Corps by the Packard Motor Car Co. The apparatus consists of a 10-ft. arm mounted upon a hollow steel mast. The hoist is operated from the Packard standard power take-off. This is manipulated by a hand lever in the center of the floor board within convenient reach of the truck driver. The radius adjustment of the arm is operated by a handwheel at the side of the driver's seat.

Two tons capacity is given at a 7½-ft. radius, and 1½ tons at a 10-ft. radius. Two substantial ratchet jacks are mounted on the sides of the truck chassis to relieve the frame from strains while the crane is in use.

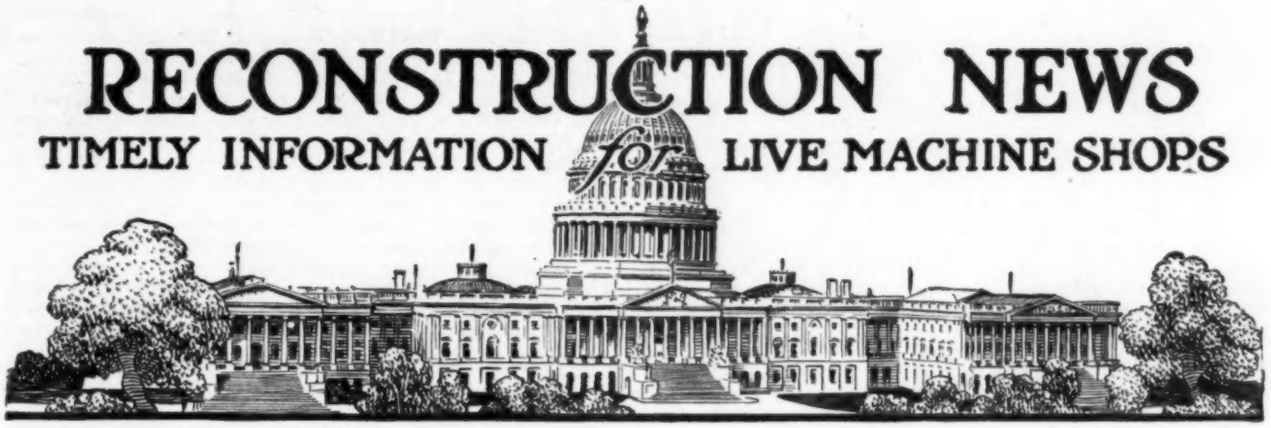
The truck in the illustration is a Packard standard 5-ton chassis, with 9 ft. 5-in. stake body and steel disk wheels, the entire outfit being painted the olive drab of the Marine Corps. Two more similar machines of 6-ton capacity each have been ordered by the Marine Corps.



MOTOR TRUCK WITH CRANE HOIST

RECONSTRUCTION NEWS

TIMELY INFORMATION *for* LIVE MACHINE SHOPS



IT SEEMS to be definitely decided that the War Industries Board will go out of existence at the end of the present year, and whatever our personal ideas on the subject may be it is up to all of us to assist in every way in keeping business stable without the control to which we have become accustomed during the past year and a half. The worst thing that can happen is a pronounced break in prices, as the uncertainty which this would produce would have a disastrous effect on all kinds of manufacturing.

The steel industry has announced a reduction in the price of steel beginning Jan. 1, which, while not definitely stated, is supposed to be about $3 a ton. As long as these reductions are announced in advance, and if some assurance can be given of the length of time the various prices will hold, manufacturers can plan accordingly, and there need be no holding back in either production or purchase on that account. The prime necessity is to maintain confidence in the future, to keep business moving as nearly normal as possible, to buy as well as to sell, and, above all, to prevent unemployment.

The machine-tool builders' convention gives perhaps as good an index to the condition of the machinery business as can be obtained. With almost no exception the machine builders were optimistic and reported conditions as being perfectly satisfactory. In some instances Government cancellations were welcomed because they gave an opportunity of supplying regular customers at an early date. In one instance a concern had received new orders for machines which more than offset all Government cancellations. In others cancellations by the Government, by prime contractors, and by subcontractors were almost negligible, while in the small-tool line business was continuing to be remarkably good.

The Future

The whole situation does not indicate any necessity for fear of the future, although it must not be overlooked that good judgment in handling the large machinery stocks that may be released is necessary to prevent a dangerous break in the market. The situation also points to the need of a better understanding in regard to cancellation clauses and the adoption of a more uniform practice in this respect. There should be definite rules as to when and how cancellations may be made, these rules of course being drawn so as to protect the manufacturer and his customer as far as may be done. It must be remembered that in the case of long-delayed deliveries a customer is taking chances in ordering machines, for, as often happens, a change in business conditions may make the machines unnecessary at the delayed date of delivery

The address of J. W. Hook, president of the Allied Machinery Co. of America, at the Machine Tool Builders' Association convention at the Hotel Astor, New York, on Dec. 10 and 11, presents the problems of the immediate future in a very comprehensive and interesting manner, and is partly quoted in what follows:

"When we review the magnificent effort that was expended by the machine-tool manufacturers of this country toward winning the war; when we think of the genius, the unstinted sacrifices that they have made; when we think of the marvelous production of machinery that they made possible and which played such a large part in the construction of the engines of war, we are almost overwhelmed in our search for words of gratitude. For no single group of men in America, outside of the fighting men themselves, did more to set the tribes of Berlin clamoring for terms of 'unconditional surrender' than the great, loyal body of American machine-tool builders.

"The increase in the manufacturing capacity of America's machine-tool industry due to the war amounts I am told to about 100 per cent. of the prewar size. This increase is not only represented in the enlargement of old-established shops but also in the creation of entirely new industries which are ready to claim their share of the business. Now that the war is over and the demand from that source eliminated, the necessity for foreign machine-tool markets is greater than ever.

"Our particular interest at this time may well be centered around the amount of business that we can obtain from these foreign markets. We are posted on the home market and know about what it will absorb, and, knowing our capacity for production, we get a clear idea of the surplus that is available for foreign consumption.

Total Manufacturing Capacity

"The total manufacturing capacity of machine tools at the beginning of the war was approximately $100,000,000 a year. When the armistice with Germany was signed the total producing capacity of the American machine-tool industry, as near as we can estimate it, was about $400,000,000 a year. Reduced to prewar costs this would total about $250,000,000. Reduced further to a straight-time labor basis it would amount to about $200,000,000 on a prewar basis. Estimating domestic consumption for the next year on a prewar basis at $100,000,000 (and it surely cannot be more) we have a surplus left for export of an equal amount, or $100,000,000 prewar value.

"The year ahead holds prospects of many serious problems. To get at the most serious one, supppose we analyze briefly the steps that have led up to it. When the war began, Germany, Austria and Belgium were immediately eliminated from the machine-tool world. All belligerents were forced to turn all of their manufacturing capacity to the production of munitions. The result was a tremendous increase in the American machine-tool industry. The next step was America's entrance into the war. This turned the tide back again from export to domestic business and left the great shops of our allies fully equipped with American machines that were rapidly wearing out. So great was America's effort that practically the whole machine-tool capacity of the nation was absorbed by it. Great Government shops equipped with millions of dollars' worth of machine tools were built here and in France. Then the war ended, leaving all these shops full of practically unused machinery on the Government's hands. Machine-tool shops all over America have millions of dollars' worth of machines in process of manufacture.

"What will become of this great surplus? Manifestly it would be most dangerous to the industry if the Government, after dismantling these plants, should offer this machinery, as is the usual custom, to the highest bidder. Can the machine-tool industry afford to have this thing happen? I sincerely hope that definite action will be taken by the members here assembled looking toward a safe and sane method of disposing of all this machinery. I should like to see the Government make each manufacturer the special disposition agent of his own line for Government account. This would mean that the Government would have to wait

a little longer for its money. But is it not wise that it should? And does not the past loyalty of the machine-tool builders of this country entitle them to liberal consideration?

"I think prices should be maintained, as the large quantity of machinery that the Government has to dispose of is having a psychological effect on customers. They are anticipating the break in prices that might occur from these machines being thrown on the market, and until the Government clearly defines its policy and absolutely protects you your customers are going to delay buying as long as they can. If prices can be kept up for the next six months, when the confidence of the buying public will have been assured and buying will have been resumed, there will be no difficulty, I believe, in going ahead with business to a most prosperous era.

"Labor also must be considered, and I think the Government would welcome some well-defined plan looking toward keeping the machine-tool industry going at a reasonable speed in order that its army of labor can be kept employed.

"I am not at all pessimistic over the future of the machine-tool industry. The privately owned shops of the world are greater today than ever before. Their machinery is badly worn. Railroads in every country need equipment of every kind. The shelves of the world were never so barren. Thousands of shops in Belgium and northern France must be rebuilt; the coal and iron mines of France must be restored; the textile mills of Belgium must be reëquipped; sugar mills all over the world must be repaired; new roads must be made, and not an item of machinery required for these industries can be constructed without the aid of machine tools.

Governmental Policy

"What we need is a definite governmental policy looking toward a protection of machine-tool prices, augmented of course by a great selling organization of the machine-tool industry itself. With these assured it will not be a year before the machine-tool industry of America will enter again on a prosperous era. The basic laws of all exporting, when conditions approaching normal arrive again, will apply to machine tools as well as to any other product. That America can compete in its manufactured products with Europe seems to me to be certain, as we still have a distinct advantage in our method of manufacture over other countries.

"The war has taught America the necessity of selling abroad from stocks on the ground. We cannot expect to compete without them. Extension of credit is another important factor; also the necessity for crating our export shipments in the smallest possible space and in the most substantial manner. The matter of exchange is likewise important from the standpoint of export business, but this question will be materially simplified when America begins to buy great quantities of foreign merchandise for delivery to all markets of the world, which will enable us to virtually trade in commodities, using exchange merely as a convenient expression of value. This will be possible when our merchant marine is plying in all the waters of the globe.

"America, due to her growing merchant marine, and also that she is now the greatest creditor nation in the world, is now in a position to assume the status of the leading merchant nation of the world. She will have to furnish means to rebuild the devastated regions of Europe. Her credit will be sought in South America and in the Orient. Her growing merchandising firms even now are engaged in the task of extending their selling organizations to all markets.

"When the war began many manufacturers in this country found their sales organizations in several of the best foreign markets completely destroyed. Then it dawned upon them how dependent the manufacturers of this country were on foreign export houses and sales agents for their export trade. Fortunately the great demand for almost everything, machinery especially, afforded our manufacturers the opportunity to make new selling connections, though we cannot expect the free markets in many countries that we enjoyed before the war. Those nations, as a unit, are going to encourage their own manufacturers in every way. Already governmental purchasing organizations in France, England, Belgium and Italy have been created, whose duties are to visé most carefully and cautiously every item to be imported. National patriotism will be brought into play, and the native houses importing goods from other countries will in duty bound buy what is needed in their own country if they can. In France they have already been asked to do this. In England the leading manufacturers of machine tools have formed a world-selling organization of their own, the concern being known as the Associated British Machine Tool Manufacturers, Ltd., and comprising the following English manufacturers of machine tools: Archdale & Co., Ltd.; Asquith, Ltd.; Butler & Co.; Churchill Machine Co.; Kendall & Gent; Lang & Sons; Parkinson & Sons; Richards & Co.; Shanks & Co.; Smith & Coventry, and Ward & Co.

"Similar organizations have already been effected in France and Italy, and other branches will be opened as circumstances will permit, each branch having a competent engineer as manager, also machine-tool expert representatives who will be appointed after careful selection.

"For the present we can only hope to sell in those countries the things that are actually and immediately needed. Their doors today are practically closed against everything but raw material. When this ban is removed we will need to have real American selling organizations on the job. These are necessary to insure the fullest loyalty to American goods and the characteristic zeal and industry in the art of selling.

"The United States should be prepared with its own sales organizations. It must assume the task of disposing of its own manufactured products. The Webb bill provides for the creation of group selling organizations by manufacturers. Under its provisions also export houses can join with manufacturers for foreign trading.

"A movement of this kind on the part of our manufacturers will encourage the establishment of American houses in foreign countries. They in turn will encourage the establishment of banking facilities. Banking facilities will encourage investment in foreign securities and industries; and as these grow in size and number the circle of America's influence will likewise grow to vast and, we may say, almost limitless proportions."

Prevent Waste of Material

If there is one thing that should stand out in all reconstruction work and in the peace settlement it is the provention of waste. And this applies equally to labor as it does to material.

Someone has proposed that as there might be some dispute as to the disposition of the German ships they be taken out and sunk in the deep blue sea at some convenient point. Could anything be more absurd?

We have robbed our mines of ore and coal to supply steel for guns, for shell and for ships; the world needs steel and needs it badly. Yet someone proposes to deliberately sink thousands of tons of good steel where it can never be of service to mankind, and as though there are not enough of them, with their valuable cargoes, now at the bottom of the sea.

If more ships of war are needed, which hardly seems necessary now that the menace to world peace has been removed, these ships should be utilized instead of building new ones. But if they are not needed, as we assume, the logical thing to do is to break them up for the material that is in them. The engines could probably be used in passenger ships yet to be built or as prime movers for factories or electric-light stations. It would certainly be wasteful to throw such machinery to the fishes.

Condensers, feed pumps, piping, hoists, and a host of other things can be directly useful; other material would be only useful as junk; but half a million tons of junk steel is not to be despised. It would go far toward rehabilitating railways and other necessities in France and Belgium, and the material might even be used for ships to replace, in part, the tonnage sunk by the U-boats.

All thought of deliberately destroying material of this or any other kind must be abandoned. The world has need of it and it should be carefully conserved by all nations.

The Machine Tool Builders' Convention

THE postponed annual meeting of the National Machine Tool Builders' Association held at the Hotel Astor, New York, Dec. 10 and 11, was probably attended by more machine-tool men than ever before. The main consideration of the meeting was naturally the readjustment of business so as to bring it back to normal in the shortest time and with the least disorganization and disturbance.

The papers and addresses were dispensed with except during the opening session, the remainder of the meeting being devoted to special meetings and committees to consider the questions now before the machine-tool industry. These include the cancellation of orders, the disposal of the machines already built but which will not be needed for the purposes originally intended, the question of raw material, of maintaining organizations and of export trade.

The opening session was favored with addresses by F. C. Schwedtman, vice president of the National City Bank; A. W. Hook, president of the Allied Machinery Corporation, and Mr. Webster of Price, Waterhouse & Co. Excerpts from these addresses will be given in these columns. The following resolution was passed by the convention:

Cancellation of Contracts

Whereas, It is in the public interest that all war orders placed by any contracting agency of the Government and accepted in good faith, whether formally and regularly executed or not, should upon cancellation by such contracting agency be promptly and equitably adjusted and resultant claims paid; be it

Resolved, That the National Machine Tool Builders' Association in convention assembled request that the principle already laid down by the Secretary of War that all cancellations and adjustments be carried out in a manner that will cause the least dislocation of industry, having in view the largest interests of the Government, the employers and employees, allowing industry to return to its normal conditions as quickly as possible, and that our members interest themselves actively to have the matter placed strongly before the Department concerned and their Members of Congress;

Resolved, That the National Tool Builders' Association in convention assembled hereby indorses the following resolutions enacted unanimously by the conference of War Service Committees at Atlantic City held under the auspices of the United States Chamber of Commerce:

"First, Taxation.—The cessation of hostilities brings to business interests a feeling of deep concern in the matter of taxation. The problems of readjustment are made more difficult through inequalities in the present law. We believe therefore that in the consideration of amendments to the present act, or the passage of new revenue legislation to the views expressed by organizations of commerce and industry, ability to pay, inventory values and proper reserves, together with careful survey of the amount of revenue required under the new conditions, are matters of vital importance to business interests of the nation during this readjustment period.

"Second, Inventories.—We urge that Congress should give careful consideration to the grave menace now facing all industry, due to the fact that both raw materials and finished goods are carried in full measure to meet the extraordinary requirements of the Government and of the people, and that in large part the stocks have been acquired at abnormal cost and are therefore carried into inventories at inflated values, thereby showing apparent profits which have not been realized and which probably will never be fully realized. These are largely bookkeeping, or 'paper,' profits, and should not be used as a basis for taxation.

"We therefore recommend that any tax law shall provide that during present conditions the taxpayer shall be allowed to make a deduction from his apparent profit by way of a reserve for a subsequent shrinkage in the value of merchandise. We believe that the interests of the Government can be protected against abuse of this privilege by the fixing of a maximum percentage of deduction to be allowed and by the use of proper methods of inspection and appraisal."

The officers for the ensuing year are: A. E. Newton, Reed-Prentice Co., president; A. H. Teuchter, Cincinnati-Bickford Tool Co., first vice president; E. J. Kearney, Kearney & Trecker Co., second vice president; C. Wood Walters, Cincinnati Milling Machine Co., secretary; Winslow Blanchard, Blanchard Machine Co., treasurer. J. B. Doan, American Tool Works, was made an honorary member of the board.

The following is a part of Mr. Schwedtman's address:

Seven years ago when I spoke to you I was one of you; at least I was a manufacturer. Today I have been for five years a bank officer. I started as a machinist many years ago. Strangely enough Mr. Vanderlip, my great chief, also started as a machinist, and we were discussing the first machine tools on which we worked. It is not only necessary to have the very best of machine tools (and I am sure from experience, from investigations in this country and in foreign countries that we do have the best machine tools in the world), but it is also necessary to educate our youth, those coming directly in contact with machine tools, as well as engineers, constructors, designers, and even bankers, with the value of machine tools.

I believe in a large and really representative organization of manufacturers in this country. Other countries have such organizations, and if you had such an organization and if that organization had been as busy, as have been the organizations of other countries, to prepare for the first day of peace as they have been preparing for the first day of war you would not be so fearful of the future.

We were not prepared for war, and we are not prepared for peace. Many of us, many of you, have been preaching that all these years that we have been in war, but today we are confronted with the immediate future. We must adapt ourselves to it because we have not the time to give the natural growth of the seed the cultivation of the harvest. We must adapt ourselves today and tomorrow, and we can, and we will.

I might put the people that come to my office—and I see probably anywhere from 25 to 50 people a day—in three classes: Those who are honestly pessimistic about the future; those who are honestly optimistic, and those who are so busy talking they have not a chance to be informed at all. The last class, I think, is the really largest and are doing the most damage.

The Present Situation

There is nothing fundamentally wrong with our industrial situation at the present time. We have been praised all the world over for ingenuity and for adapting ourselves to the conditions that confront us. If we do that today there is but very little to fear. Your position is not very different from that of a great many other manufacturers. The wool manufacturers were very much worried lest the Government would release the oversupply of wool which it had gathered. The cotton manufacturers were afraid of the same trouble. I am sure at the bottom of your hearts that is what is worrying you most today. What does it mean? It means closer coöperation between the Government. There is no reason why the industries of the United States should be controlled by the Government. I for one am strictly opposed to Government control; but whatever we may say about that, now is not the time to throw Government coöperation aside. We need it more now for the benefit of all of us than we have ever needed it before.

We need closer coöperation between the bankers and the manufacturers. We knew that peace was coming. You all knew it. We have prepared our branches in various countries. We are at this very time engaged in establishing new branches in Europe, in South America and in the Far East. If you only have definite representation through international organizations you will not be so much dependent upon the immediate market here at home, and if you can only hold your tools—those that may be accumulated at the present time for the Government, or for private ownership—if you can only hold them and not let the pub-

lic become panic stricken; if you will only talk optimism instead of pessimism, or if you cannot talk optimism you will not say anything at all I am not afraid of the future.

We are in a better condition in the United States than any other country in the world. We have all the markets that we had before the war. If we now adapt ourselves immediately to present conditions we are going to get nicely through the present situation, but it requires a great deal of confidence. You do not want to have a weak link in your chain. You want to be absolutely certain that you have the right sort of an agency for your tools.

I have sold goods in South America and I know that you need to have the best sort of agent; you need to have the best sort of a banker; you need to have the best sort of a manufacturer, and you need even to educate the machinists and the youngster in the use of your tools. I have always been an enthusiast on education. I am now. The great institution of which I am a member, the National City Bank, has 1200 out of its 1700 employees attending its daily educational classes, because it believes that the degree in which it can serve you, and in which it can serve the world, depends directly on the education of its employees.

Do not let any of those educational programs lag on account of the present situation, because while we must resume immediately we can only hope to meet the future if we have an immediate program and a future program, a program that will not change no matter whether the times are good, bad or indifferent. If we remember that we have the world as a market, as we now have it, we will have less fluctuation in our situation at home than we have ever had in the past.

The banks are prepared for us. You have the best tools in the world. Now make sure that your chain is complete, that every link is in its proper place, and there is not any doubt in my mind as to what you can do in the future.

Co-operation With Government

Would not this be the very time when we could coöperate with the Government to work out some special program? See the water powers of this country which could be developed! And this development means machine tools. We have never been able to do it. Years ago I was one of a society of engineers who drafted a plan to utilize the Mississippi all the way from St. Paul down to Cairo, and we figured out that the scheme at that time would cost $300,000,000.

In those days $300,000,000 was an awful lot of money. Today it is not. I am not, by any means, sure that the three hundred millions might not have brought better and quicker returns than the Panama Canal, and that is not saying a word against the Panama Canal. It simply means that a national program such as the electrifying of all our power, or the greater part of it, would help wonderfully in getting over the present situation.

That is the kind of Government coöperation that we should have. We need no Government control to do those things. We need no control by the financiers. You gentlemen are the manufacturers, the industries of the country, and the ones that can initiate those things; but the Government ought to help you. The bankers will help you. I am quite sure there is no reason in the world to be afraid of the financial situation, providing we do not forget that at the present time, the same as at all times, the amount that we have to spend depends upon the thrift of our people.

The Thrift Campaign

The thrift campaign is not over because we need less money for war purposes. We need all the money we can get in order to have the nation work on one carefully worked-out program which covers all the elements of a nation that ought to be interested in a national program.

If we have a strike on hand or if someone does not thank us for the things that we have done we must not consider every worker bad. Many of them have as good common sense as we have, and if we only can get the good employers, the good workers and the good bankers on one side of the fence, and get the bad ones on the other side we need not be afraid of Bolshevism in this country.

All the good banks in this country stand ready to back the manufacturers to the fullest extent in home and foreign trade. In many cases we will have to provide long-term payments because many of the countries have not the money to pay promptly. Then again you need the banker in the chain. We have lent liberally to foreign countries. We will have to continue to do it. We will have to be prepared when those loans come due to extend them. We will possibly have to be prepared to accept additional securities for the interest on those loans, and we can do it. We have changed from a large debtor nation to a large creditor nation. We are in decidedly better shape than we have ever been, and if we do not lose confidence, if we all get together, if we work together, if we plan together we are bound to have a better future than we have had in the past.

Developing Markets for Machinery

The Bureau of Foreign and Domestic Commerce announced that W. H. Rastall has been appointed Trade Commissioner to study the markets for American industrial machinery in the Orient. Mr. Rastall will leave shortly for Japan, China and other Far Eastern countries, and it is expected that his investigation will occupy the better part of two years. In order to make his mission of the greatest practical value Mr. Rastall will spend a few days in New York, and manufacturers and exporters wishing to discuss their problems with him can arrange for appointments by communicating with the district office of the Bureau of Foreign and Domestic Commerce, No. 734 Custom House.

Mr. Rastall is a graduate mechanical engineer, having studied at Cornell University, and is a member of the American Society of Mechanical Engineers. In addition to practical experience in this country, he was for seven years the resident engineer of a large American corporation in Japan, developing the sale of American industrial machinery. He probably has the distinction of having introduced the first modern municipal filtration systems in Japan and China, also in Korea, and he sold practically everything from a large sugar mill to a popcorn popper that an enterprising Japanese used for parching rice.

The machinery export trade differs from others in that it depends on the various opportunities arising in connection with industrial developments. The fluctuations in our exports from year to year are not important because there is nothing consistent in the foreign trade in this line. One year, for instance, exports of textile machinery may be large and the following year refrigerating machinery will predominate, but there is always a large demand throughout Asia for many kinds of industrial machinery, according to Mr. Rastall.

Although our export statistics for 1916 and 1917 are hardly comparable with those of normal years they will afford an idea of the growth of our trade in machinery with the Orient. We sold to China in the last two fiscal years nearly $500,000 worth of textile machinery, about $175,000 worth of metal-working machinery, $150,000 worth of milling machinery and large quantities of other equipment. India's purchases from the United States included more than $700,000 worth of oil-well machinery, $155,000 worth of pumps and $135,000 worth of mining machinery. The industrial expansion of Japan is reflected in its imports of American equipment in 1916 and 1917, among which were metal-working machinery, $1,500,000; milling machinery, $465,000; mining and oil-well machinery, $365,000, and paper and pulp mill machinery, $175,000. Korea, one of the largest buyers of American mining machinery in the Orient, took almost $200,000 worth in the period mentioned. The Dutch East Indies imported the following American equipment in 1916 and 1917: Oil-well machinery, $450,000; metal-working machinery, $300,000; pumps, $230,000, and mining machinery, $185,000.

Dealing in America's Greatest Assets

Professional Division of the United States Employment Service Assists Experienced Technical Men of the Army and Navy to Find Their Places in the Work of Reconstruction

AMERICA'S greatest assets, the brain power and energy of her thoroughly trained young men, are the commodities in which the Professional Division of the United States Employment Service is dealing. Officers and men of the Army and Navy released from active service are being registered with the division and placed in touch with employers who can best make use of such services in their establishments.

* *

THE Professional Division deals only with men who are well equipped by education and experience in their particular line of work. The record of each man is carefully investigated before registration is permitted. Many university graduates in mechanical, electrical and civil engineering, and in chemistry, and other technical men with several years of practical experience have already been registered. These men who willingly severed their business relations more than a year ago to give their services to their country are returning to civil life to find changed conditions. Although the industry of the country has great need of their services, neither men nor employers are able, without assistance, to discover each other immediately. To avoid delay in the readjustment processes, not only the labor of the country but also the highly trained directors of industry are being mobilized with the assistance of the Government. The aim is that each man shall fit in our business organization where he can do his best work.

THE task of dealing with thoroughly trained men who in many instances can command high-salaried positions is requiring the assistance of those technical organizations which have heretofore placed university graduates and experienced men with employers. The Professional Division is seeking to coöperate with all such societies by referring properly qualified men to them, or by obtaining from them data on positions that are open or available.

* *

THE engineering field appears to present the largest problems of the Professional Division. Thus far nearly one-half of all the applicants have been qualified for work in various forms of the engineering profession. The temporary lull in general-construction work has in part closed one field which, it is believed, will be more available by the time the oversea forces begin a large-scale demobilization and return to industry.

* *

THE Professional Division of the United States Employment Service has its New York office at No. 16 East 42nd St. Its registrations of experienced men are increasing. Employers seeking such men are asked to inform the Professional Division of the precise nature of the positions which they have at their disposal. Only those men who are considered to be well qualified to fill such positions are referred to the employer making application.

SPARKS FROM THE WOR

E. C. PORTER,

War Plants Will Retain Employees

No Wholesale Discharge of War Workers to Be Made on Account of Cancellation of Contracts

One hundred and thirty firms or corporations manufacturing war necessaries at the time of the signing of the armistice, whose contracts have been suspended or canceled, were asked by Henry Bruere, Federal Director of the United States Employment Service for the State of New York, what the effect would be on their labor. Sixty replied cancellation or suspension of war contracts would in no way affect their labor situation nor would any men be discharged.

Of these 60 the replies were from the larger employers of labor, each of the other firms employing fewer than 25 men. Only one concern of the 60 announced its intention of laying off workers. This concern is dispensing with two girls. Some of the firms which will maintain their present working forces are the Chevrolet Motor Co., Ames Iron Works, Atterbury Motor Truck Co. Bausch & Lomb Co., Durston Gear Corporation, National Biscuit Co., Eastman Kodak Co., Standard Oil Cloth Co., Selden Motor Truck Co., Pierce-Arrow Motor Co., Wayne Wheel Co., Keystone Manufacturing Co., Ingersoll-Rand Co., Oswego Boiler and Engine Co., Auburn Converting Co., Brockway Motor Truck Co., and Buffalo Belting and Weaving Company.

* * *

Ship Record Broken

Ship deliveries broke all previous records during the week ended Nov. 8, when American yards turned over to the Shipping Board 101,000 deadweight tons, bringing the grand total to 507 ships and 2,893,000 tons since the board began its work. Of the 20 ships delivered during the week, three were requisitioned steel, of 26,800 tons; five were contract steel, of 32,200 tons; 11 were wood, of 38,500, and there was one composite 3500-ton vessel.

* * *

New Engineering Firm Formed in New York

Dwight P. Robinson, a former partner of Stone & Webster, in charge of their construction and engineering business, has opened offices in New York under the name of Dwight P. Robinson & Co., Inc., constructing and consulting engineers. Associated with him will be R. M. Henderson, in charge of construction; C. W. E. Clarke, mechanical engineer; R. A. Philip and D. L. Galusha, electrical engineers, and M. E. Thomas, structural engineer, together with the nucleus of a strong purchasing, accounting and field construction organization. All of these men, for many years, have been engaged in large undertakings under Mr. Robinson's direction.

* * *

Making Her Debut as a Machinist

Will the young lady in the oil-soaked blue overalls working in a machine shop ever again find anything in the old feminine life half so interesting as

working amid the whirl of wheels, the crunch of lathes and the rattle and roar of the machines in the shop? Or will she let go of the lever and take up the frying pan and the mop handle with renewed zeal after her little fling at mechanical employment?

* * *

War Machinery to Be Preserved

While the big American aircraft program has been stopped and officials and experts are undoing contracts covering hundreds of millions of dollars arrangements are being made to preserve the machinery which made possible the manufacture of Liberty motors in large numbers and other successful war material. Preservation of motor machinery will be applied all along the line by the War Department. Jigs, dies and tools for the manufacture of cannon, machine guns and other war equipment in enormous quantities will be stored and safeguarded.

Farm Tractors Produced in the United States

An investigation of the tractor situation in this country recently was completed by the Office of Farm Equipment Control, United States Department of Agriculture. The purpose was to obtain information regarding the status of the farm-tractor industry in order to determine what action would be necessary to facilitate an adequate and equitable distribution of tractors throughout the country. The investigation was made pursuant to the President's proclamation of May 14, 1918, relating to the farm-equipment industry. In connection with this investigation a report was received from every tractor manufacturer in the country concerning the number of tractors manufactured and their distribution between Jan. 1, 1916, and July 1, 1918.

A summary of these reports is as follows: Number of tractors manufactured in 1916, 29,670; in 1917, 62,742; from Jan. 1 to June 30, 1918, 58,543, giving a grand total of 150,955.

Tractors sold to users in 1916 were 27,816; in 1917, 49,504; to exporters in 1917, 14,854; 1918 (first six months) 15,610. Tractors on hand, in transit, or held by dealers at the time of the report (August, 1918) were 11,388.

* * *

Free to Soldiers and Sailors

The *American Machinist* will be glad to publish free of charge in its positions-wanted column advertisements of men released from United States Government forces, who are seeking employment in the field covered by the paper.

In sending copy please name the branch and unit of service from which you were released, and also indicate whether you wish to receive replies direct or in care of the *American Machinist* to be forwarded without charge.

All advertisements will be published for four weeks unless canceled sooner. Until further notice additional insertions will be made for a similar period upon the writer's request to do so until employment has been found.

* * *

Building New Type of Mail Airplane

According to Second Assistant Postmaster General Praeger the Post Office Department is building a new flying machine especially designed and equipped for the nation-wide aero mail service soon to be inaugurated.

The most important feature claimed is that it can light on an ordinary city lot to deliver its cargo of mail.

LD'S INDUSTRIAL FORGE

NEWS EDITOR

Good Prices for Machine-Tool Equipment at Auction

About 300 manufacturers from all over the country attended the auction sale on Nov. 25 of the machine-tool equipment of the Smith Form-A-Truck Co. held at its old plant in Chicago. The equipment sold amounted to approximately $250,000, every piece of which was bought by those present. The prices paid were over 80 per cent. of present catalog prices for new machine tools. Bidding in all lines was particularly high, the heavier pieces of machinery claiming the greatest attention. This would indicate that the demand for equipment during the reconstruction period will be sufficient to compensate in some degree for the loss occasioned to machine-tool manufacturers by the cancellation of their war orders.

Chicago machine-tool dealers have noted that inquiries during the past week or two for machine tools are keeping up to almost the number of six months ago, at the time of the heaviest demand for tools for war work. The general impression this sale has created on manufacturers and dealers is that everyone interested is already awake to the demands of post-war manufacturing and those who are in a position to do so are immediately taking care of their future requirements by buying up everything in sight, so that they will not be caught by a lack of supply of machine tools as at the beginning of the war. It was said that none of the buyers at the sale were machine-tool dealers, but were bonafide users.

Personals

I. H. MILLS, who has been with the Westinghouse Electric and Manufacturing Co. of East Pittsburgh, Penn., for the past 23 years, has become superintendent of the Sperry Gyroscope Co., Brooklyn, N. Y. Mr. Mills began his career with the Westinghouse company as a machine operator, finally becoming superintendent of the small industrial-motor department.

JOHN BROOKS EMORY, general superintendent of the Poole Engineering and Machine Co., has taken a similar position with the Morgan Engineering Co., Alliance, Ohio. Mr. Emory was formerly connected with the Baltimore & Ohio R.R.; he then became superintendent of motive power with the Kansas City Southern, and later went with the Poole company. He was given a dinner at the Emerson Hotel, Baltimore, on Nov. 12, by the officials of the Poole company and was presented with a diamond ring as a remembrance from his former associates. Mr. Emory is a graduate of Purdue University.

Business Items

The English Tool and Supply Co. has opened a sales office and display rooms at 1930 Grand Ave., Kansas City, where it will handle standard makes of machine tools and up-to-date machine-shop supplies. A. F. Eichman is in charge of the new machine-tool department.

The Call of Humanity

is "Join the Red Cross"

and meet the demands of today and the coming year. We are about to embark on undertakings vast in scope and sacred in purpose. Our obligations to our millions of soldiers and sailors and our deepened obligations to our allies call for tremendous energy, broad wisdom and profound humanity. Each American soldier and sailor must have every care and comfort that the nature of his heroic work does not positively prohibit. It is hoped and expected that this great ambition will be realized. It can be if every patriotic man and woman makes it his responsibility to get universal membership in the Red Cross.

The Puritan Machine Co. has purchased from the American Ball Bearing Co., Cleveland, Ohio, its entire service and repair parts business, including a complete stock of parts, tools, jigs, dies, blueprints, etc., covering all American axles manufactured prior to Jan. 1, 1918. The stock is being removed to the Detroit plant of the Puritan company.

The Plymouth Motor Manufacturing Co., formerly the Steiner Manufacturing Co., Plymouth, Wis., at its annual meeting elected the following officers: President, George W. Brickbauer; vice president, Charles Steiner; secretary, Frank Schryer; treasurer, Gustav W. Schiereck; directors, George Gerhard, H. J. Goelzer and C. C. Arndt. The company manufacturs gasoline and kerosene engines and motors.

Shipyards Offer Work to Soldiers

Men Awaiting Demobilization Will Be Furnished Information as to Places Open in Shipyards

The United States Shipping Board and the War Department have decided that soldiers now in camp awaiting demobilization are to be given official information of jobs in shipyards and on merchant vessels when they lay aside their uniforms.

There are now 1,700,000 men in the 31 military camps in this country, a considerable number of whom are skilled mechanics, sailors and boatmen, or landsmen with a liking for the sea, who would be a valuable accretion to the merchant marine and shipyards, where it is said 200,000 jobs are open.

The Shipping Board will send to every camp a committee of three agents representing respectively its industrial relations division, the merchant-marine recruiting service and the combined employment services of the shipyards.

Each committee will be officially received, and will have an officer assigned to assist it. Statements prepared by the Shipping Board's representatives will be issued in every camp by the authority of the commanding officer, and will contain the Shipping Board's message of sure jobs and good pay after camp routine gives way to the uncertainties of civil life.

The Shipping Board's agents will also speak to meetings of the soldiers and exhibit motion-picture films showing the details of modern shipyard work and picturesque phases of seagoing in the new merchant marine.

No actual recruiting will be done at the camps. The men will be supplied with information by the means described and through personal interviews, of men specially interested, with the Shipping Board's representatives.

When the soldier is ready to take a job the Shipping Board will tell him the nearest place of employment, either in a shipyard or on a ship. Shipyard workers will be given jobs in the lines for which they are best fitted and in yards that need them most. Men who have never been to sea will first be given special instruction on board training ships of the United States Shipping Board. These ships have their bases at various Atlantic and Pacific ports, and make short cruises to sea while the apprentices on them are getting their "sea legs." After six weeks' training the apprentices are sent on deep-water voyages on merchant vessels.

WEEKLY PRICE GUIDE OF

IRON AND STEEL

PIG IRON—Quotations compiled by The Matthew Addy Co.:

	Current	One Month Ago
CINCINNATI		
No. 2 Southern	$37.60	$37.60
Northern Basic	34.80	34.80
Southern Ohio No. 2	35.80	35.80
NEW YORK, Tidewater delivery		
Penna. 2X	39.55	39.15
Virginia No. 2	41.70	41.70
Southern No. 2	41.70	41.70
BIRMINGHAM		
No. 2 Foundry	34.00	34.00
PHILADELPHIA		
Eastern Pa. 2X	39.15*	38.85*
Virginia No. 2	40.50†	40.50†
Basic	36.90*	36.60*
Grey Forge	36.90*	36.60*
Bessemer	39.10*	38.80*
CHICAGO		
No. 2 Foundry Local	34.50	34.50
No. 2 Foundry Southern	39.00	39.00
PITTSBURGH, including freight charge from the Valley		
No. 2 Foundry Valley	35.40	35.40
Basic	34.40	34.40
Bessemer	36.60	36.60

* F.o.b. furnace. † Delivered.

STEEL SHAPES—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

	New York		Cleveland		Chicago	
	Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Structural shapes	$4.27	$4.245	$4.20	$4.17	$4–4.04	$4.27	$4.20
Soft steel bars	4.17	4.145	4.10	4.17	4–4.04	4.17	4.10
Soft steel bar shapes	4.17	4.145	4.10	4.17	4.14	4.17	4.10
Soft steel bands	4.77	4.995					
Plites, ¼ to 1 in. thick	4.52	4.495	4.45	4.42	4.39	4.25	4.45

BAR IRON—Prices per 100 lb. at the places named are as follows:

	Current	One Year Ago
Pittsburgh, mill	$3.50	$4.75
Warehouse, New York	4.75	4.75
Warehouse, Cleveland	4.67	4.95
Warehouse, Chicago	4.10	4.50

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	Pittsburgh, Mill, in Carloads	New York			Cleveland		Chicago	
		Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
*No. 28 black	5.00	6.52	6.495	6.445	6.42	6.45	6.52	6.445
*No. 26 black	4.90	6.42	6.395	6.405	6.32	6.35	6.42	6.405
*Nos. 22 and 24 black	4.85	6.37	6.345	6.295	6.27	6.30	6.37	6.295
Nos. 18 and 20 black	4.80	6.32	6.295	6.245	6.22	6.25	6.32	6.245
No. 16 blue annealed	4.45	5.72	5.695	5.645	5.62	5.65	5.72	5.645
No. 14 blue annealed	4.35	5.62	5.595	5.545	5.52	5.55	5.62	5.545
No. 10 blue annealed	4.25	5.52	5.495	5.445	5.42	5.45	5.52	5.445
*No. 28 galvanized	6.25	7.77	7.745	7.695	7.67	7.70	7.77	7.695
*No. 26 galvanized	5.95	7.47	7.445	7.395	7.37	7.40	7.32	7.395
No. 24 galvanized	5.80	7.32	7.295	7.245	7.22	7.25	7.47	7.245

* For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gages; for galvanized corrugated sheets add 5c., all gages.

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring at least 1000 lb. of a size (smaller quantities take the standard extras) the following discounts hold:

	Current	One Year Ago
New York	List plus 13%	List plus 25%
Cleveland	List plus 11%	List
Chicago	List plus 13%	List plus 10%

DRILL ROD—Discounts from list price are as follows at the places named:

	Extra	Standard
New York	35%	40%
Cleveland	35%	40%
Chicago	35%	40%

SWEDISH (NORWAY) IRON—The average price per 100 lb., in ton lots is:

	Current	One Year Ago
New York	$15.50-19	$14.00
Cleveland	20.00	15.00
Chicago	19.00	13.50

In coils an advance of 50c. usually is charged.
Note—Stock very scarce generally.

WELDING MATERIAL (SWEDISH)—Prices are as follows in cents per pound f.o.b. New York, in 100 lb. lots and over:

Welding Wire*		Cast-Iron Welding Rods	
½, ⅜, ¼, 5/16, 3/16, No. 8, 7/32 and No. 10	22.10 to 33.00	3/16 by 12 in. long	16.00
		7/32 by 19 in. long	14.00
No. 12		¼ by 19 in. long	12.00
5/32, No. 14 and 1/8		¼ by 21 in. long	12.00
No. 18		*** Special Welding Wire**	
No. 20		½	33.00
		5/16	30.00
		3/16	38.00

* Very scarce.

MISCELLANEOUS STEEL—The following quotations in cents per pound are from warehouse at the places named:

	New York Current	Cleveland Current	Chicago Current
Openhearth spring steel (heavy)	8.00	8.00	7.50
Spring steel (light)	10.00	11.25	11.75
Coppered bessemer rods	9.00	8.00	7.07
Hoop steel	4.77	4.75	4.77
Cold-rolled strip steel	8.02	8.25	8.57
Floor plates	6.27	6.00	6.25

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

BUTT WELD

Steel			Iron		
Inches	Black	Galvanized	Inches	Black	Galvanized
⅛, ¼, and ⅜	44%	17½%	⅛ to 1¼	33%	17%
½	48%	33½%			
¾ to 3	51%	37½%			

LAP WELD

2	44%	31½%	2	26%	12%
2½ to 6	47%	34½%	2½ to 4	28%	15%
			4½ to 6	28%	15%

BUTT WELD. EXTRA STRONG PLAIN ENDS

⅛, ¼ and ⅜	40%	22½%	½ to 1¼	33%	18%
½	45%	32½%			
¾ to 1¼	49%	36½%			

LAP WELD. EXTRA STRONG PLAIN ENDS

2	42%	30½%	2	27%	14%
2½ to 4	45%	33½%	2½ to 4	29%	17%
4½ to 6	44%	32½%	4½ to 6	28%	16%

Stock discounts in cities named are as follows:

	New York		Cleveland		Chicago	
	Black	Galvanized	Black	Galvanized	Black	Galvanized
⅛ to 3 in. steel butt welded	40%	28%	41%	26%	41.1%	26.1%
3½ to 3 in. steel lap welded	36%	25%	37%	23%	37.1%	23.1%

Malleable fittings. Class B and C, from New York stock sell at list+15%. Cast iron, standard sizes, 5% off.

METALS

MISCELLANEOUS METALS—Present and past New York quotations in cents per pound, in carload lots:

	Current	One Month Ago	One Year Ago
Copper, electrolytic	26.00*	26.00	23.50
Tin in 5-ton lots	72.00	83.00	80.00
Lead	7.05	8.55	6.50
Spelter	8.60	9.50	8.00

* Government price.

ST. LOUIS

Lead	6.75	8.25	6.38
Spelter	8.25	9.25	7.75

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

	New York			Cleveland		Chicago	
	Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Copper sheets, base	38.00	38.00	35.00	38.00	35.00	36.00	35.00
Copper wire (carload lots)	35.00	35.00	36.00	35.00	31.00	33.00	33.50
Brass sheets	39.75	39.75	35.75	40.50	34.00	33.50	35.00
Brass pipe	46.00	46.00	38.50	42.50	46.50	44.00	41.00
Solder (half and half) (case lots)	55.00	58.00	40.50	47.00	43.25	56.00	41.00

Note:—Solder very scarce.

Copper sheets quoted above hot rolled 16 oz., cold rolled 14 oz. and heavier, add 1c.; polished takes 1c. per sq.ft. extra for 20-in. widths and under; over 20 in., 2c.

BRASS RODS—The following quotations are for large lots, mill. 100 lb. and over, warehouse; 25% to be added to mill prices for extras; 50% to be added to warehouse price for extras:

	Current	One Year Ago
Mill	$37.75	$29.00
New York	34.25	30.00
Cleveland	38.50	34.00
Chicago	29.50	37.00

SHOP MATERIALS AND SUPPLIES

ZINC SHEETS—The following prices in cents per pound prevail:
Carload lots f.o.b. mill 15.00

	In Casks		Broken Lots	
	Current	One Year Ago	Current	One Year Ago
Cleveland	18.75	21.00	18.40	21.50
New York	17.00	20.00	17.50	20.25
Chicago	22.00	21.00	21.50	21.50

ANTIMONY—Chinese and Japanese brands in cents per pound, in ton lots, for spot delivery, duty paid:

	Current	One Year Ago
New York	9.50–10.50	15.00
Chicago	10.00	17.00
Cleveland	11.75	16.00

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

	New York		Cleveland		
	Current 1918	One Year Ago	Current 1918	One Year Ago	Chicago
Copper, heavy and crucible	20.00	22.00	19.00	21.00	18.50
Copper, heavy and wire	19.00	21.00	18.00	21.00	18.00
Copper, light and bottoms	17.00	19.00	15.00	20.00	16.50
Lead, heavy	6.00	4.75	6.00	5.50	6.00
Lead, tea	4.75	4.00	4.00	4.50	5.25
Brass, heavy	11.00	15.00	14.00	14.00	18.00
Brass, light	9.00	10.50	13.00	11.00	10.00
No. 1 yellow brass turnings	11.00	16.00	10.00	15.00	10.50
Zinc	5.25	5.75	5.00	5.50	5.25

ALUMINUM—The following prices are from warehouse at places named:

	New York	Cleveland	Chicago
No. 1 aluminum, guaranteed over 99% pure, in ingots for remelting (1-15 ton lots), per lb	33.20c.	32.30c.	33½c.

This is the Government price for lots of from 1 to 14 tons.

COPPER BARS from warehouse sell as follows in cents per pound, for ton lots and over:

	Current	One Year Ago
New York	32.00	40.00
Chicago	38.00	40.00
Cleveland	36.50	37.00

BABBITT METAL—Warehouse price per pound:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade	90.00	70.00	80.00	86.00	75.00	70.00
Commercial	45.00	40.00	21.50	21.00	15.00	25.00

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Hot pressed square	$0.80	1.00	$1.25	$1.40	$0.98	$2.00
Hot pressed hexagon	.80	1.00	1.05	1.20	.78	2.00
Cold punched hexagon	2.50*	1.00	.75	List	1.00	1.50
Cold punched square	2.50*	1.00	.75	List	1.00	1.50

* List plus.

Semi-finished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	50–10%	50%
Chicago	50%	45%
Cleveland	50–10%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
½ by 4 in. and smaller	40–10%	40–10%	37%
Larger and longer up to ½ in. by 30 in.	20–5%	20– 5%	25–5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:
For wrought-iron washers:
New York ..... $2.00 Cleveland ..... List Chicago $2.50
For cast-iron washers the base price per 100 lb. is as follows:
New York ..... $6.00 Cleveland ..... $4.25 Chicago $4.50

CARRIAGE BOLTS—From warehouses at the places named the following discounts from list are in effect:

	New York	Cleveland	Chicago
½ by 4 in. and smaller	40%	45%	32½%
Larger and longer up to 1 in. by 30 in.	20–5%	20–5%	20%

COPPER RIVETS AND BURS sell at the following rate from warehouse:

	Rivets		Burs	
	Current	One Year Ago	Current	One Year Ago
Cleveland	List plus 10%	List plus 10%	List plus 10%	List plus 10%
Chicago	List price	List price	List plus 20%	List price
New York	15% from list	List plus 10%	List plus 5%	10-2½% from list

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ½ and smaller	40%	45—5%	40%
Tinned	30%	45—5%	40%

Boiler, ½, ⅝, 1 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.:
New York...$5.675 Cleveland...$5.15 Chicago...$5.67 Pittsburgh...$4.65
Structural, same sizes:
New York...$5.775 Cleveland...$5.25 Chicago...$5.77 Pittsburgh...$4.75

MISCELLANEOUS

SEAMLESS DRAWN TUBING—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

	New York	Cleveland	Chicago
Copper	52.00	40.00	44.00
Brass	49.00	38.00	41.00

For immediate stock shipment 3c. is usually added. The prices of course vary with the quantity purchased. For lots of less than 100 lb., but not less than 75 lb., the advance is 2c.; for lots of less than 75 lb., but not less than 50 lb., the advance is 5c. over base (100-lb. lots); for less than 50 lb. but not less than 25 lb., 10c. should be added to the base price; and for quantities of from 10 to 25 lb. the extra is 25c.; less than 10 lb., add 35c.

Double above extras will be charged for angles, channels and sheet-metal mouldings if ordered in above quantities. The above extras also apply to brass rod other than standard stock sizes—stock sizes being considered as ¼ up to 2 in. inclusive in rounds, and ¼ up to 1½ in. inclusivein square and hexagon—all varying by thirty-seconds up to 1 in. and by sixteenths over 1 in. On all shipments aggregating less than 100 lb. there is usually a boxing charge of $1.50.

TIN PLATES—Warehouse prices per box:

Coke tin plate, 14 x 20:

	Cleveland		Chicago	
	Current	One Yr. Ago	Current	One Yr. Ago
100 lb.	$9.17½	$12.00	$10.60	$11.75
I. C. 107 lb.	9.42½	12.17½	10.70	11.90

Terne plate, 20 x 28:

Base Weight	Net Weight	Coating				
100 lb.	200	3	18.95	18.95	19.10	17.90
I. C.	214	8	19.25	19.25	19.40	18.25
I. C.	270	8	21.75	21.75	21.40	20.35
I. C.	218	12	21.75	21.75	22.60	19.25
I. C.	221	15	22.50	22.50	22.10	19.50
I. C.	226	30	23.25	23.25	22.60	20.50
I. C.	231	25	24.50	24.50	23.10	21.30
I. C.	236	30	25.75	25.75	23.60	22.25
I. C.	241	35	26.75	26.75	25.10	23.25
I. C.	246	40	28.00	28.00	25.60	24.55

NOTE—New York prices furnished on application to dealers. Price varies according to whether the plates are wanted for work essential to the war or for nonessential work.

COTTON WASTE—The following prices are in cents per pound:

	New York			
	Current	One Year Ago	Cleveland	Chicago
White	11.00 to 13.00	13.00	16.50	12.00 to 16.50
Colored mixed	8.50 to 12.00	12.00	13.00	11.50 to 14.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13½ x 13½	13½ x 20½
Cleveland	52.00	58.00
Chicago	48.00	50.00

SAL SODA sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$1.75	$1.75	$1.75
Philadelphia	1.75	1.75	1.75
Cleveland	2.62½	2.40	2.35
Chicago	2.00	2.00	2.00

ROLL SULPHUR in 360-lb. bbl. sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$3.65	$4.30	$4.30
Cleveland	4.25	4.60	4.50
Chicago	4.50	4.00	4.00

COKE—The following are prices per net ton at ovens, Connellsville, and cover the past four weeks:

	Dec 12	Dec. 5	Nov. 27	Nov. 21	Nov. 14
Prompt furnace	$6.00	$6.00	$6.00	$6.00	$6.00
Prompt foundry	7.00	7.00	7.00	7.00	7.00

FIRE CLAY—The following prices prevail:

		Current
Chicago	450-lb. bbl.	$2.50
Cleveland	375-lb. bag	2.50

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw in barrels	$1.59	$1.25	$1.90	$1.25	$1.77	$1.22
5-gal. cans	1.84	1.35	2.00	1.40	1.97	1.32

WHITE AND RED LEAD in 500-lb. lots sells as follows in cents per pound:

	Red				White	
	Current		1 Year Ago		Current	1 Year Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100-lb. keg	14.00	14.50	12.25	12.50	14.00	12.50
25 and 50-lb. kegs	14.25	14.75	12.50	12.75	14.25	12.75
12½-lb. keg	14.50	15.00	12.75	13.00	14.50	13.00
5-lb. cans	.....	.....	14.25	14.00	16.00	14.50
1-lb. cans	.....	.....	14.25	14.50	17.00	14.50

NEW *and* ENLARGED SHOPS

Consult the Buying Section when in need of machinery or supplies

WASHINGTON, D. C.

The Navy aims to give information regarding its purchases to all manufacturers known to be in a position to supply its demand. Owing to the need of prompt action in the cases of all machine tools hereinafter listed, the Navy cannot arrange to permit a postponement of the opening of bids if the manufacturers are able to secure bidding forms and submit their bids prior to date fixed for opening.

In case time does not permit this, it will be appreciated if any manufacturer not receiving information directly regarding these purchases will notify the Purchasing Division, Bureau of Supplies & Accounts, Navy Department, Washington, D. C., in order that the firm's name may be properly listed for all future purchases.

The Bureau of Supplies and Accounts, Navy Department, will soon receive bids furnishing machines and machine tools as follows:

Schedule No. 3547, miscellaneous twist drills, delivery various yards.

Schedule No. 3557, 75 coppering punches, delivery Brooklyn, N. Y.

Schedule No. 7280½, 1 heavy duty shaper, 100 lamp guards, 1 blacksmith's forge, 1 breast drill, hacksaw, 1 motor-driven grindstone, 1 floor grinder, 1 twist drill grinder, 1 pipe cutting and threading machine, 1 milling machine, 1 drill press, 1 motor-driven planer, 1 motor-driven lathe and 1 combination chuck, delivery Brooklyn, N. Y.

Schedule No. 7396½, 1 power crusher, 1 grinding apparatus, 1 hacksaw, 1 drill press, 1 electric drill, 1 inverted metalloscope, 1 millimeter, 1 power grindstone, 1 motor grinder, 1 assayer's furnace, 1 electric furnace and 6 testing machines, delivery Washington, D. C.

Schedule No. 7412½, 1 thread milling machine, delivery Alexandria, Va.

Schedule No. 7419½, 2 lapping, filing and saw machines, delivery Washington, D. C.

Schedule No. 7420½, 5 motor-driven lathes and 1 band saw, delivery Brooklyn, N. Y.

Schedule No. 7424½, 1 grinding mill, delivery Norfolk, Va.

Schedule No. 7426½, 1 arbor bench saw, 1 single-cylinder surfacer, 1 multiple borer, 1 vertical spindle and desk sander and 1 band saw and resaw combination, delivery Norfolk, Va.

Schedule No. 7456½, 1 squaring shear, delivery Norfolk Va.

Schedule No. 7447½, 3 balancing machines, delivery Philadelphia, Penn.

Schedule No. 7461½, plate bending rolls, delivery Norfolk, Va.

Schedule No. 7462½, 4 forging machines, delivery Norfolk, Va.

Schedule No. 7464½, two 3-ton cranes, delivery Alexandria, Va.

Schedule No. 7469½, 1 universal lathe, and 2 each of grinders, cutters, reamers and surfacers, delivery Alexandria, Va.

METAL WORKING

NEW ENGLAND STATES

Conn., Hartford—The Ellison Construction Co., 60 Prospect St., will build a 1-story, 42 x 128 ft., factory on Wellington Ave., to be leased to the American Machinery Co., 277 Wethersfield Ave., for light factory work. Estimated cost, $10,000.

Conn., Salisbury — The Central New England R. R. has awarded the contract for the erection of a repair shop and engine house here. J. H. Gallivan, 19 Parker Ave., Poughkeepsie, N. Y., Div. Engr.

Mass., Boston—The Trimont Manufacturing Co., 55 Armory St., has awarded the contract for alterations and an addition to its 1-story forge shop. Noted Oct. 31.

Mass., East Boston (Boston P. O.)—Fire recently damaged the 1-story plant of the Gibby Foundry Co., 94-100 Condor St.

Mass., Orange—The Leavitt Machine Co., 10 East River St., is having plans prepared for a 1-story, 60 x 140 ft. addition to its plant. Estimated cost, $10,000.

R. I., Providence—The Marine Engineering and Drydock Co. of Rhode Island, recently incorporated, is building a drydock on Allen's Ave. between the Terminal Warehouse and the Harbor Junction pier of New York, New Haven & Hartford R. R. Plans include a marine railway, boiler and plate shop, general machine shop, store sheds and galvanizing shop, a repair dock and office building. Estimated cost, $500,000. G. L. Gross, 301 Union Trust Bldg., Secy.

R. I., Providence—The Providence Steel and Iron Co., Kinsley Ave., has awarded the contract for the erection of a 1-story, 100 x 102 ft., fabricating plant. Estimated cost, $25,000. Noted Nov. 28.

D. C., Bellevue—The Bureau of Yards and Docks, Navy Department, Washington, has awarded the contract for the installation of electrical traveling cranes at the structural shop here. Estimated cost, $29,800.

D. C., Washington—The Bureau of Yards and Docks, Navy Department, will receive bids until Dec. 30, installing two 20 ton electric traveling cranes in the tool and miscellaneous shops. Estimated cost, $28,000.

D. C., Washington—A. L. Flint, Purchasing Agent for Panama Canal, Washington, will receive bids until Dec. 26, for furnishing machines and machine tools as follows: 1 frame grindstone, with stone assembled, 36 x 6 in., equal to that shown in figure 13002, page 877, Manning, Maxwell & Moore's catalog of machine tools, 1909 edition; 288 high grade hacksaw blades for power machine, with soft back, 1 x 24 in., No. 18 gage, 15 point, soft back, hand, hacksaw blades, 15,000 to be 12 in. with 14 teeth to the inch; 2400, 12 in. with 23 teeth to the inch; 360, 14 x ¾ in., No. 18 gage, 15 points.

Md., Hancock—The Hancock Foundry Co. plans to install about $15,000 worth of foundry equipment in its new addition. Noted Dec. 5.

Md., Indianhead—The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans to install an electric gantry crane, here. Estimated cost, $125,000.

N. J., Camden—The Camden Iron Works, Line St. and Coopers Creek, has had plans prepared for a 1-story, 90 x 127 ft. foundry to be erected on Line and Perry St.

N. J., Irvington (Newark P. O.)—The Smith & Hemenway Co., 124 Colt St., manufacturer of tools, is having preliminary plans prepared for the erection of an addition to its plant.

N. J., Perth Amboy—The Standard Underground Cable Co., 26 Washington St., has had plans prepared for the erection of a 1-story, 60 x 130 ft. addition to its plant to be used as a copper tube works. Noted Dec. 12.

N. Y., Albany—The Adirondack Steel Corporation is having plans prepared for the erection of a plant here.

N. Y., Buffalo—The Buffalo Specialty Co., 375 Ellicott St., manufacturer of hardware specialties, has had plans prepared for a 2-story, 50 x 112 ft. addition to its plant to be erected on Northland Ave. Estimated cost, $6500. Noted Sept. 5.

N. Y., Buffalo—The Delaware, Lackawanna & Western R. R., Hoboken Terminal, Hoboken, N. J., plans to build a repair shop and car shed, here. Estimated cost, $100,000. J. G. Ray, Hoboken, N. J., Ch. Engr.

N. Y., New York (Borough of Brooklyn)—The American Machine and Foundry Co., 56th St. and 2nd Ave., has acquired three 3-story buildings at 5508 2nd Ave., for an addition to its plant. H. D. Best, Flatiron Bldg., New York City, Engr.

N. Y., New York (Borough of Brooklyn)—Beswick Bros., 272 Kent Ave., manufacturer of electrical appliances, has awarded the contract for a 1-story, 50 x 100 ft., factory to be erected on Erasmus St. near Lott St. Estimated cost, $6000.

N. Y., New York (Borough of Brooklyn)—The Bureau of Yards and Docks, Navy Department, Washington, D. C., has awarded the contract for a 6-story, 100 x 400 ft. machine shop, to be erected here. Estimated cost, $1,000,000. The contract has also been awarded for the installation of electric traveling cranes at the structural shop. Estimated cost, $33,600.

N. Y., New York (Borough of Brooklyn)—The L. R. Building Co., 189 Montague St., will build a 2-story, 75 x 100 ft., garage. Estimated cost, $25,000.

N. Y., New York (Borough of Manhattan)—A. B. Meyer, 32 Greene St., has had preliminary plans prepared by W. D. Kilpatrick, Arch., 149 Broadway, for a 2-story, 100 x 130 ft. garage to be erected at 2479 Amsterdam Ave. Estimated cost, $25,000.

N. Y., New York (Borough of Richmond)—The Lighthouse Department, Washington, D. C., has awarded the contract for a 2-story, 70 x 120 ft. addition to its machine shop in Tompkinsville. Estimated cost, $30,000.

N. Y., Rochester—F. L. Heughes & Co., Inc., 190 South Ave., has had plans prepared for three 1-story, 70 x 120 ft., 50 x 180 ft. and 20 x 60 ft., factory buildings to be erected at 595 Lyell Ave. Estimated cost, $50,000. Noted Dec. 5.

N. Y., Schenectady—The General Electric Co., River Rd., is building an addition to its carpenter shop No. 76, a new sub-station at building No. 95B, and other improvements. Estimated cost, $80,000.

N. Y., Syracuse—The Crane Co., 215 South West St., manufacturer of valves, etc., has had plans prepared for the erection of a 1-story, 35 x 125 ft., addition to its plant on West Belden Ave.

N. Y., Utica—The New York Central R. R., Grand Central Terminal, New York City, has awarded the contract for a 1-story, 40 x 150 ft. car shop to be erected at its terminal yards, here. Estimated cost, $12,000. G. W. Kittredge, New York City, Ch. Engr.

Penn., Allentown—The Camo Corporation, New Rochelle, N. Y., manufacturer of Camoscope motion picture machinery, plans to build a plant here.